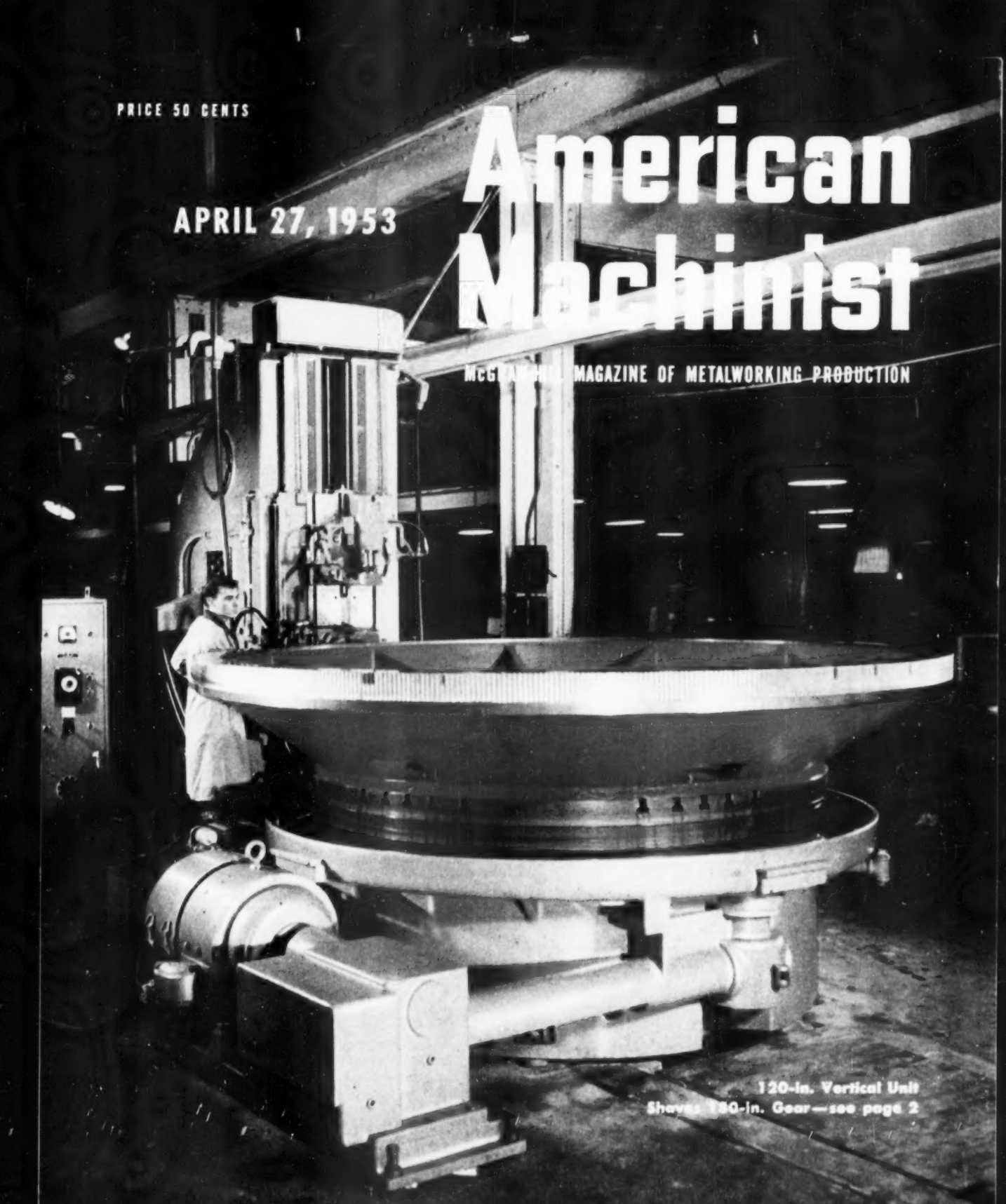
PRICE 50 CENTS

American Machinist

APRIL 27, 1953

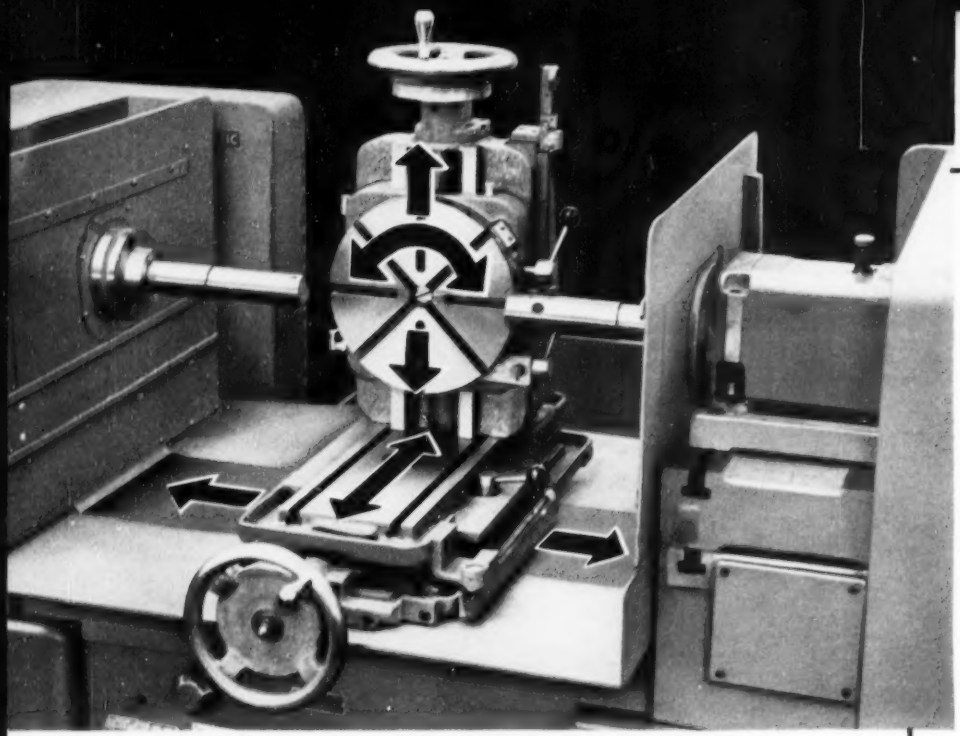
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



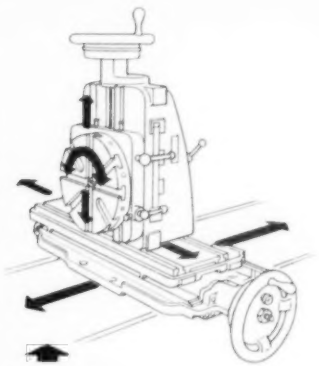
120-in. Vertical Unit Shaves 180-in. Gear—see page 2

How Dixie Makes Tank Engines — A SPECIAL REPORT

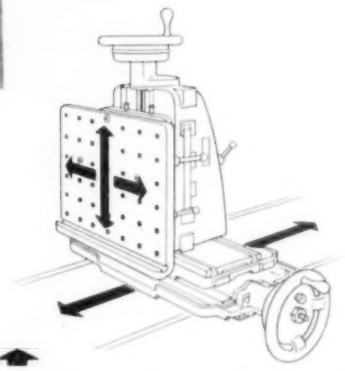
Zone-Heated Dies Form Magnesium



Heald Universal Fixture with rotary indexing face plate permits borizing from both ends on this Heald Model 322 Bore-Matic.



Heald Universal Fixture with rotary indexing face plate mounted parallel to cross slide.



Heald Universal Fixture with rectangular face plate mounted parallel to cross slide.

Here's why the Heald

UNIVERSAL FIXTURE

gives MAXIMUM VERSATILITY for small-lot borizing

● The accuracy, finish and economy of Heald Borizing is not limited to long-run jobs with special, custom-built fixtures and tooling. A standard machine, equipped with a Universal Fixture, offers maximum versatility for small-lot borizing on a wide range of miscellaneous parts.

This time-saving Universal Fixture permits indexing of work or tools horizontally, vertically or angularly. Multiple surfaces can be bored, faced or turned with "jig-borer" precision at a single set-up.

The vertical and horizontal slides can be equipped with calibrated handwheels, gage blocks and integral dial indicators for maximum precision of fixture adjustment. This cuts set-up time, speeds change-overs, and permits exact duplication of settings for repeat jobs.

Two styles of Universal Fixture are available — with either a rotary indexing face plate or fixed rectangular face plate for holding the work, tools or auxiliary fixtures. With either type, the face plate can be mounted parallel to the machine table ways or parallel to the cross slide travel. Universal Fixtures are more usually applied to models 221, 321, and 421 (single-end) Heald Bore-Matics. Double-end setups on the two larger size models 322 and 422 have proved successful where circumstances permit.

Ask your Heald representative for complete details on this Universal Fixture. Or write for your copy of Bulletin No. 7-25-1. Remember — when it comes to precision finishing, it pays to come to Heald.

HEALD

Case Study No. 2239-96 in **PRECISION PRODUCTION**

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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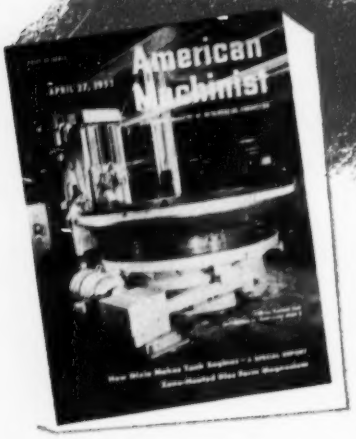

Chips and QUIPS

Vertical Shaver . . . Our front cover shows the new Model V-120 Michigan vertical shaving machine, second largest of a new series of big shavers, but beyond that it shows several other things. First, it is a big shaving machine, taking a gear of 120-in. max gear diameter. But the gear it is shaving is the table drive gear for the 180-in. machine of the same type, described in this issue, which makes our second point: machine tools can reproduce themselves. Third, the machine has a hole in the table, so entire gear and shaft assemblies can be shaved so the gear-tooth profile is exactly concentric with the shaft journals—which, for instance, makes for the quietness that reduces chances of sonic detection. Fourth, the gear being shaved is a bit over machine capacity, but can be handled by moving the column back considerably on its ways, indicating modern flexibility. Fifth, the machine can have two cutter heads, so two gears of the herringbone type can be shaved simultaneously.

Tricycle Ride . . . Last November, Executive Editor Tangerman visited the Michoud Ordnance Plant near New Orleans, making tank engines, and operated by Chrysler for the Army. The plant was so large that he rode around and through the conveyor lines on a motor-tricycle, alternately hanging on and taking notes. The results of that note-taking, liberally supplemented by shop executives and illustrated with the best set of plant photos we've seen in several years, forms our current Special Report. As usual, we try to show the operations that will interest and aid you, out of the hundreds performed there on this complex job.

Tools by Bid? . . . J J Kohl, president and general manager of International Tool Co, Dayton, contributes the current article in our NTDMA series. He points out that, every so often, some company thinks it can save money by getting competitive bids on tools and dies. But the bidder isn't fooled; he knows he has a chance of 1 in 3 or 4 of getting the order. So he puts on it as many hours as his chance at the job is worth. Does this give the customer his money's worth? What about the money saved at the design spigot being wasted at the production bung?

X-ray Fluoroscopy . . . Thomson Lab of GE, at Lynn, Mass., has developed a new method of analyzing alloys. A fluorescent X-ray spectrometer determines constituents in a few minutes, as compared with days or weeks by chemical analysis. R M Brissey and G A Chase of GE Lynn tell about it.

Hot Dies . . . Emerson Electric found the best way to draw magnesium sheet was in zone-heated dies. Here's a description of the setup and results to date—a good tooling story.

Roundup . . . Several months ago, we dug into the business of grinding carbide tools. Several articles resulting from our digging on the subject have already appeared; in this issue is a roundup of the rest of the data . . . There's also another story on carbide, this time for cold-heading dies. It gives best practice and experience, based on Carboloy records. Our old friend, A Earle Glen, is the author.

Coming . . . May 11 *AM* will be our Materials Handling Number, because of the forthcoming Show. The Special Report will be on chip handling, and will include the latest on cutting-fluid filtration, a booming field. There'll be descriptions of new equipment to be shown at the Show, plus articles on a "dispatching" conveyor at Sheffield Gage, super-carriers at Douglas Aircraft, conveyorized telephone production by Western Electric, and a definitive article on how to set up a materials-handling program. There'll also be a cover picture and lead article showing how Carrier makes refrigeration and air-conditioning coils, the first time this process has been described, plus several other articles, including one on a specific chip-handling installation.

APPRENTICE TO PRESIDENT . . . J J Kohl served his machinist apprenticeship, then barnstormed around the country as a tool, die, and gage maker on everything from adding machines to automobiles. He also did tool designing and engineering, studied accounting, then set up bookkeeping and cost systems for several die shops. From shop foreman, he worked up to manager, then started his own shop, the International Tool Company, Dayton, 30 years ago. He was an organizer and is a director of Interstate Tool, Detroit.

He brought tool and die shop men together during NRA days to form Natl Tool, Die & Machine Shop Institute, and was its first president and treasurer. He also helped organize the Tool Mfrs Assn of Dayton and has been its president several times, was president of NTDMA in '48-'49, and was on the Natl Advisory Committee for the Tool & D'e Industry. He is a 32° Mason, a 25-year member of the SAE, and a member of ADA.

ONE CUT
FROM THE SOLID
16 D. P. and Finer

- Gleason No. 2 Straight Bevel Generator
- Complete Precision Gears in one Operation
- Features Interlocking Multi-blade CONIFLEX® Cutters
- Easily Set-up for Job Lot Quantities
- Can Be Equipped with Automatic Loader
- Cuts CONIFLEX® Gears . . . Localized Tooth Bearing

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CINCINNATI FILMATIC No. 10"-L Plain Hydraulic Grinding Machine

CINCINN

CINCINNATI

CENTERTYPE GRINDING MACHINES • CENTERLESS
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC

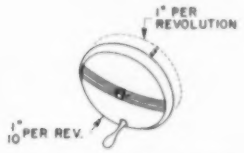
Look at it . . .

OPERATORS PREFER CINCINNATI FILMATIC PLAIN HYDRAULIC GRINDERS

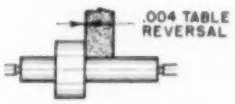
Give the operator a machine he likes to run, and you'll find that high quality and low cost go hand-in-hand. In the field of precision centertype grinding, operator preference is for CINCINNATI FILMATIC Plain Hydraulic Grinders. They're dependably accurate, easy to operate; they remove metal rapidly. A few advantages of CINCINNATI FILMATICS are illustrated here.

Grinding wheel spindle bearings are FILMATICS. They are dependable — require no adjustment for any type of finish.

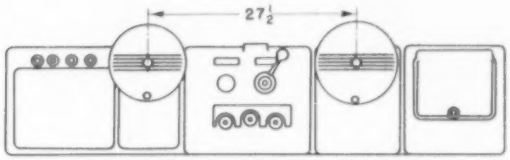
Single START-STOP lever for coolant flow, headstock spindle rotation and table traverse; reduces operating fatigue.



Two-speed manual table traverse; for convenience in setting up the machine.



Accuracy of table reversal .004"; for safely grinding close to shoulders.



Convenient arrangement of controls for comfortable, efficient operation.

These and many other advantages of CINCINNATI FILMATICS are preferred by shopmen everywhere. They are the type of advantages that will give your precision centertype grinding program clear sailing for many years. And there's no better time than now to replace your old plain grinders with new CINCINNATI's. Brief specs. will be found in Sweet's Machine Tool Catalog. Complete data in two catalogs: No. G-566-2 for the 6" and 10"-L size; No. G-603 for the 10" and 14"-L size. Write for copies.

ATI

GRINDING MACHINES
GRINDING MACHINES

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

Why *Blackstone* uses

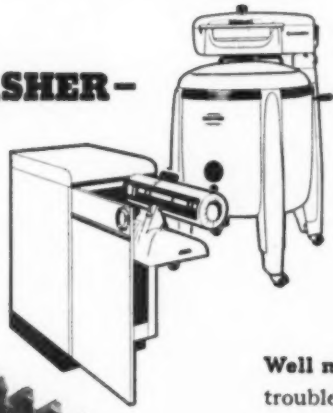
FELLOWS

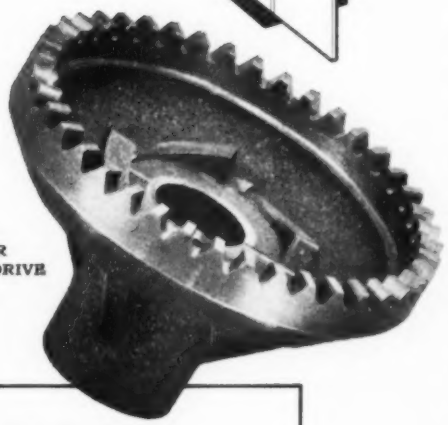
Diameter of Gear
Number of Teeth
Face Width of Blank
Pitch
Pressure Angle
Blank Material
Gear Shaper Strokes per rev. of cutter
Number of Cuts Taken
Feed per Stroke — Finishing
Production Rate (Pieces per Hour)
Governing Tolerances

WRINGER GEAR
AND HUB ASSEMBLY

Fellows-cut Face Gears

IN ITS WASHER– IRONER PRODUCTS





IRONER ROLL DRIVE GEAR

Well made products that give long-time, trouble-free service to the user are sure to gain his continued satisfaction.

Blackstone builds just such products—and by so doing maintains its outstanding reputation for quality in the highly competitive electrical appliance field.

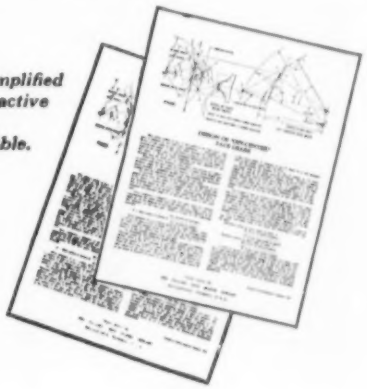
The use of face gears and pinions cut on Fellows Gear Shapers is one of the contributing factors to the success of Blackstone equipment. Production costs are low because these gears are easy and economical to produce and assemble. Quality of product is maintained because they transmit power quietly and efficiently. Long-time, trouble-free service is assured because they provide the smooth running action and the tooth strength needed to reduce the possibilities of breakdown to the minimum.

Contact the nearest Fellows office for details on the way you can take advantage of Fellows experience in furnishing up-to-date solutions to your gear manufacturing problems.

PERFORMANCE TABLE

WRINGER GEAR	IRONER GEAR
2.813	2.837
25	42
3/16	5/32
10/12	16
20°	20°
C-1010 SH SAE	CAST IRON
1620	893
1	1
.002	.004
18	13
.002	.002

DATA SHEETS *describing a simplified procedure for determining the active face width for "on-center" and "off-center" face gears are available.*



Fellows

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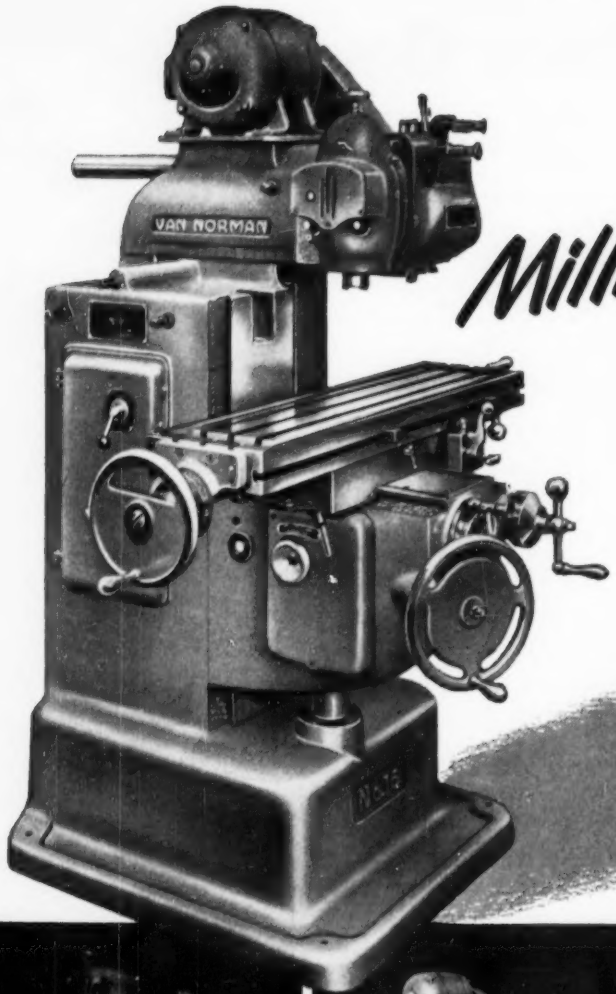
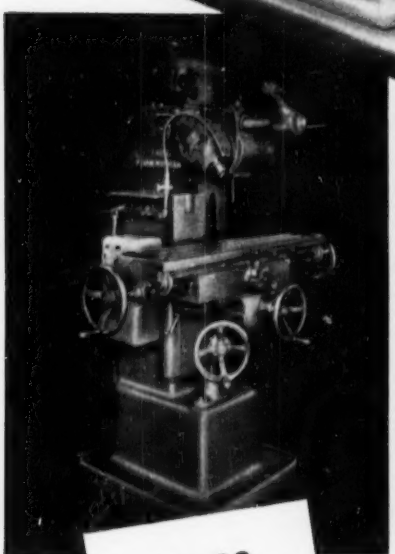
Milling Production Simplified





No. 12
Table: 37½" x 9⅛"
Cutterhead in
Angular Position

No. 16
Table: 37" x 9½"
Cutterhead in
Horizontal Position

No. 22L
Table: 45" x 10"
Cutterhead in
Vertical Position

VAN NORMAN

is Speeded, and More Accurate with

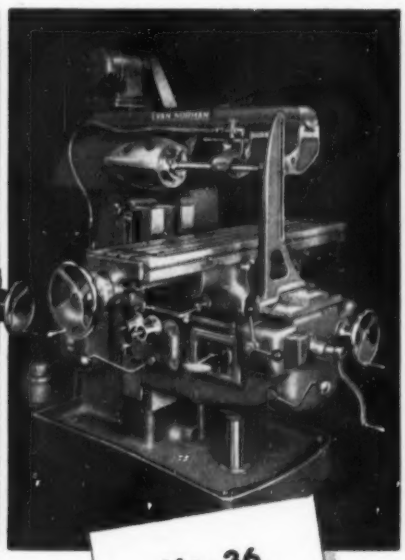
VAN NORMAN
Ram-Type Millers

Equip your toolroom and production lines with modern Van Norman Ram-Type Millers that provide new ease of set-up and control . . . smoothness in operation on the heaviest of cuts . . . and plenty of weight and power to keep on turning out work of highest accuracy under the strenuous schedules that today's conditions impose.

Featuring the adjustable cutterhead and movable ram, these Millers enable the operator to go from vertical to angular to horizontal milling with a minimum of resetting of work and with standard arbors and cutters. Operation is simplified because the controls are placed right at the operator's fingertips. Rigidity to maintain accuracy on the heaviest cut is assured by the balanced design of each machine.

All these features sum up to the highest output, fewest errors, lowest milling cost and machine maintenance. Find out how Van Norman Ram-Type Millers can save on your work. Write for catalogue.

No. 26
Table: 58" x 13"
Cutterhead in
Angular Position



No. 36
Table: 64" x 14"
Cutterhead in
Horizontal Position

No. 38
Table: 64" x 14"
Cutterhead in
Horizontal Position

COMPANY, SPRINGFIELD, MASSACHUSETTS, U. S. A.

BE SURE TO VISIT OUR EXHIBIT AT THE TULSA OIL SHOW—MAY 14-23

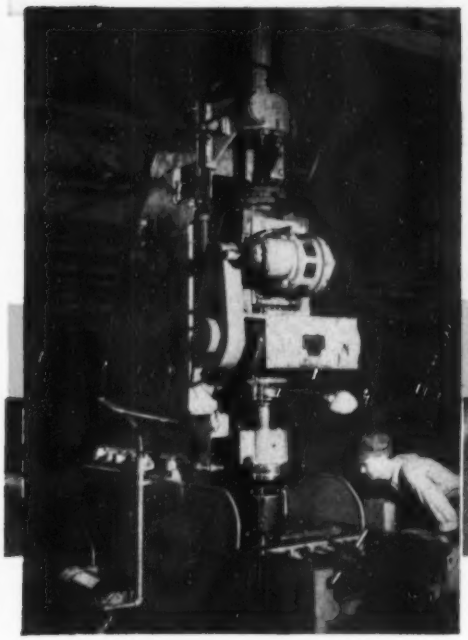
3746

THREADS TAPPED IN 12 MINUTES...

BAKER OIL TOOLS, INC., of Los Angeles, California, reports that a *LANDIS* CBLM Circular Chaser Tap mounted on a Stamet's vertical tapping machine has reduced threading time 75%, tapping 6⅝" to 13⅜" diameter threads in casing shoes.

Production examples illustrate the large savings made in threading time: (1) tapping 13⅜" N-80 tubular stock, oil well casing shoe with 8 Pitch API round threads 5" long requires but 12 minutes; (2) tapping a 6⅝" piece with an 8 pitch API round thread 5" long takes only 8 minutes. Formerly, threading a typical casing shoe would have required all of 40 minutes.

The *LANDIS* CBLM Tap, as used at Baker, is designed for use on production tapping machines to thread line pipe, casing, and drill pipe couplings. The tap head is detachable, and with the use of the various size tap heads available, the CBLM Tap will tap threads ranging from 4½" to 13⅜" O.D. It will cut either 3/16", ⅜", or ¾" tapered threads well within all API Standards, and can also be arranged for straight threading. Infinite taper adjustments are possible either above or below the required degree of taper to assure precision accuracy.



LANDIS manufactures a wide variety of taps for the economical production of internal threads ranging from 1¼" to 13⅜", either straight or tapered threads, on both stationary and rotating spindle machines. To ensure complete information, please enclose specifications when writing.

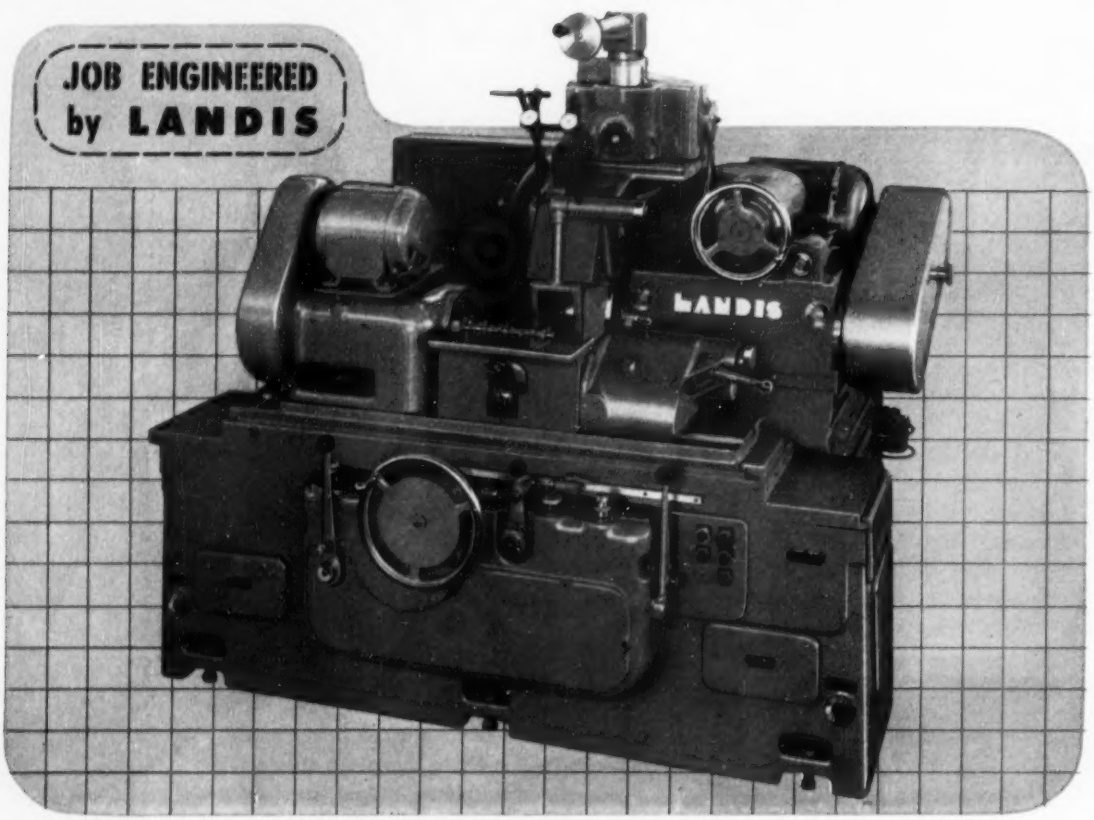
50th ANNIVERSARY

LANDIS WAYNESBORO PENNSYLVANIA

— BOOTHS 17 & 18, CALIFORNIA BUILDING

How LANDIS JOB ENGINEERING cuts grinding costs . . .

Plain Grinder with Spaced Wheels Can Do Work of Two or More Machines



Landis 10" x 18" Type CH Plain Grinder with spaced grinding wheels and hydraulically operated, wheelbase mounted overhead dresser.

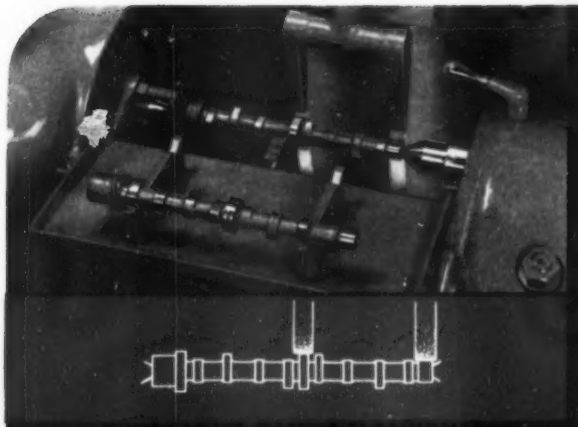
136

LANDIS
precision grinders

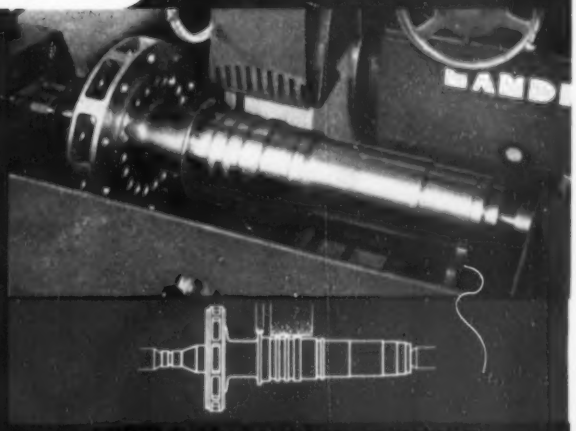
JOB ENGINEERED by LANDIS means ideas that will produce the highest return on your investment. It starts with operator convenience, hydraulic controls and simplified maintenance of a *standard* grinder. Then, on the basis of your requirements of finish, tolerance and production, we apply tooling, such as spaced wheels, to increase production and accuracy.

Landis Grinders are engineered to *your* specific requirements. They give you the fastest return on your investment. Send us your prints for tooling and production estimates. Landis Tool Co., Waynesboro, Pennsylvania, U.S.A.

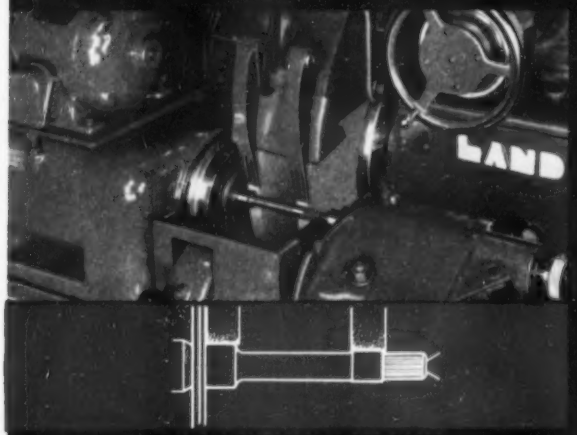
JOB ENGINEERED by LANDIS



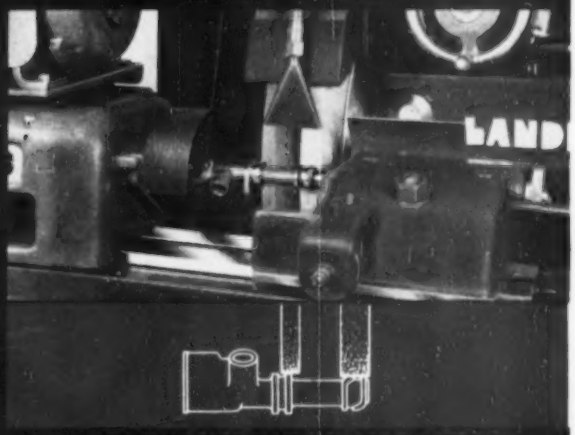
CENTER AND END BEARINGS OF CAMSHAFT GROUND IN ONE OPERATION



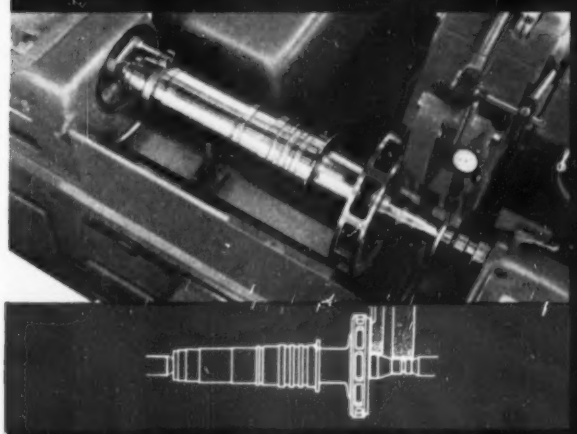
GRINDING VARIOUS DIAMETERS OF PROPELLER SHAFT WITH SPACED WHEELS AND SPECIAL FEED



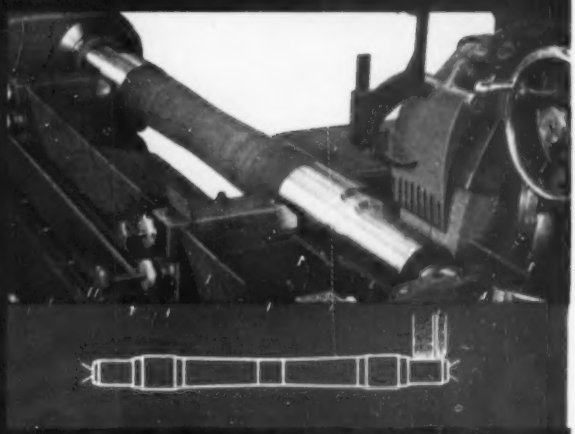
TWO DIAMETERS OF INPUT SHAFT GROUND SIMULTANEOUSLY



OIL PUMP BODY DIAMETERS GROUND WITH TWO WHEELS OF DIFFERENT GRADES



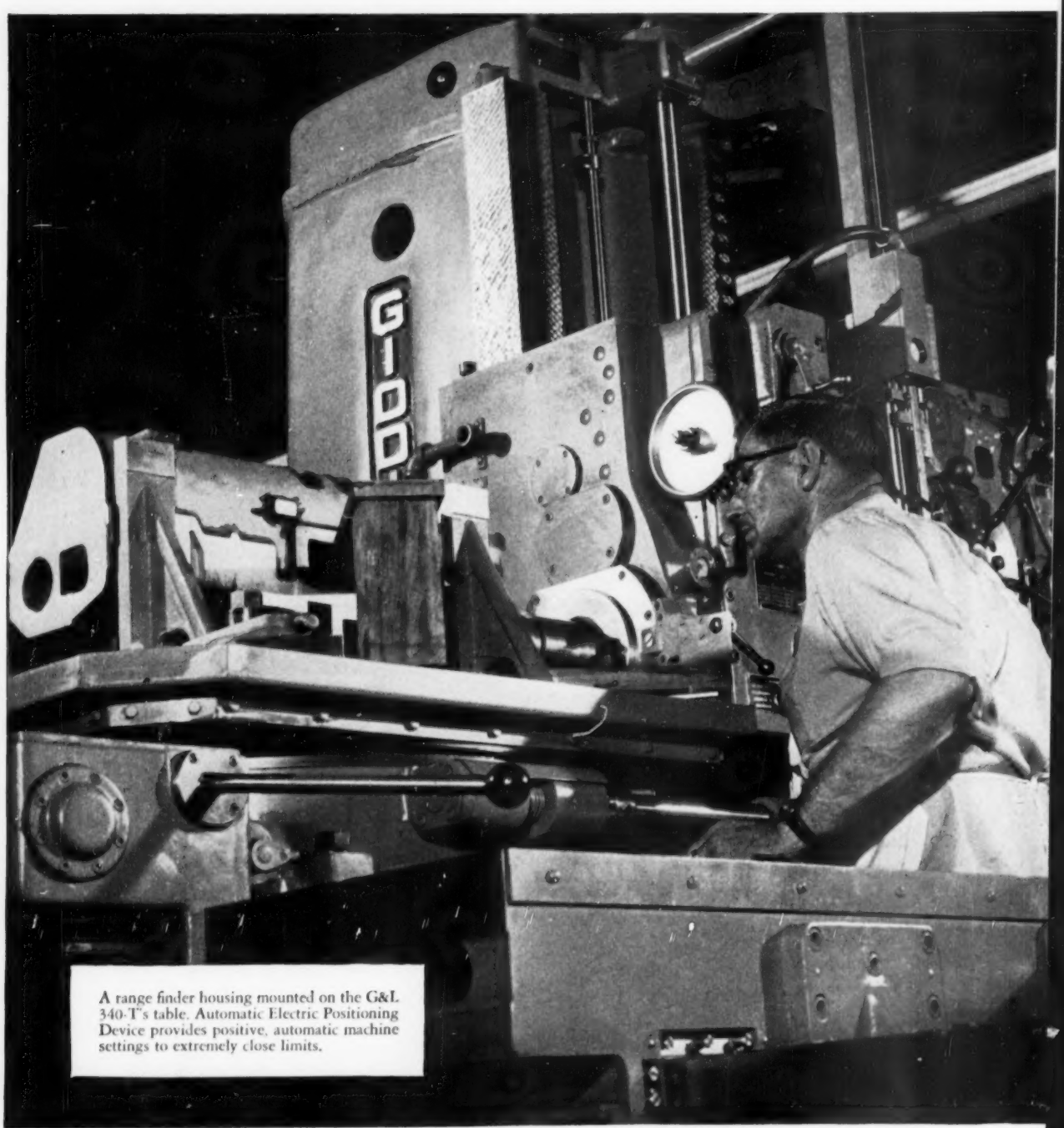
END DIAMETERS OF PROPELLER SHAFT GROUND IN ONE OPERATION



SPACED WHEELS WITH RADIUS ON CORNERS FOR GRINDING RAILROAD CAR AXLES

LANDIS TOOL COMPANY / WAYNESBORO, PENNSYLVANIA, U. S. A.

Automatic positioning production-machine



A range finder housing mounted on the G&L 340-T's table. Automatic Electric Positioning Device provides positive, automatic machine settings to extremely close limits.

...a new low cost way to ultra precision parts

Here's an exciting report from a producer of optical instruments. They're production-machining jigs, fixtures, prototypes and parts to .0002" tolerances on a G&L Horizontal Bar with an Automatic Electric Positioning Device.

E. E. Jeffery, Supt., Production Engineering, Anaheim Division, Northrup Aircraft, Inc., reports a G&L 340-T Horizontal Boring, Drilling and Milling Machine with an Automatic Electric Positioning Device is pioneering a highly efficient new method of production-machining delicate precision parts. The machine performs multiple operations from a single setup . . . positions and repositions the workpiece *automatically* . . . holds tolerances well within .0002"!

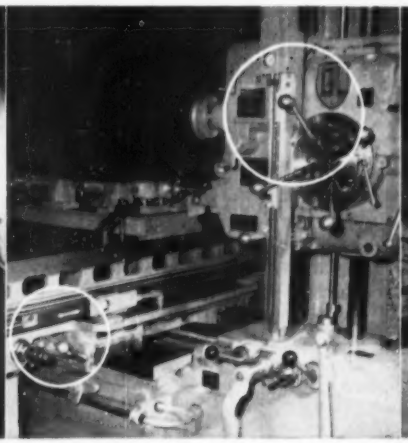
For example: To complete an optical range finder housing, pre-determined settings are made with measuring rods and micrometer. After the casting has been set up, the Electric Positioning Device operates to precisely these limits, mechanically controls all table and headstock movements from there on in. Tolerances on this operation are held to ± .0005", parallelism to .001" per 4'.

In addition, Northrup also uses the versatile 340-T to handle jobs on which the production rate does not warrant special machines or special tooling. Some of the work is performed in areas using the full length of the machine's table travel. But even with the table extended, extreme accuracies are consistently maintained.

In a leading technical trade journal, Mr. Jeffery wrote, "We've found the 340-T furnishes faster cutting speeds, heavier cuts, better finishes, greater accuracy and improved operating economy. Its speed and feed ranges are so well designed that it can provide excellent performance for an overall range of milling, drilling and boring practices in all ferric and non-ferric materials."

To get all the facts on this G&L machine, with the Automatic Electric Positioning Device, or the complete line of precision-plus G&L machine tools, contact your G&L representative or write direct.

The operator adjusts the standard precision and measuring rods and inside micrometer in vertical trough on headstock.

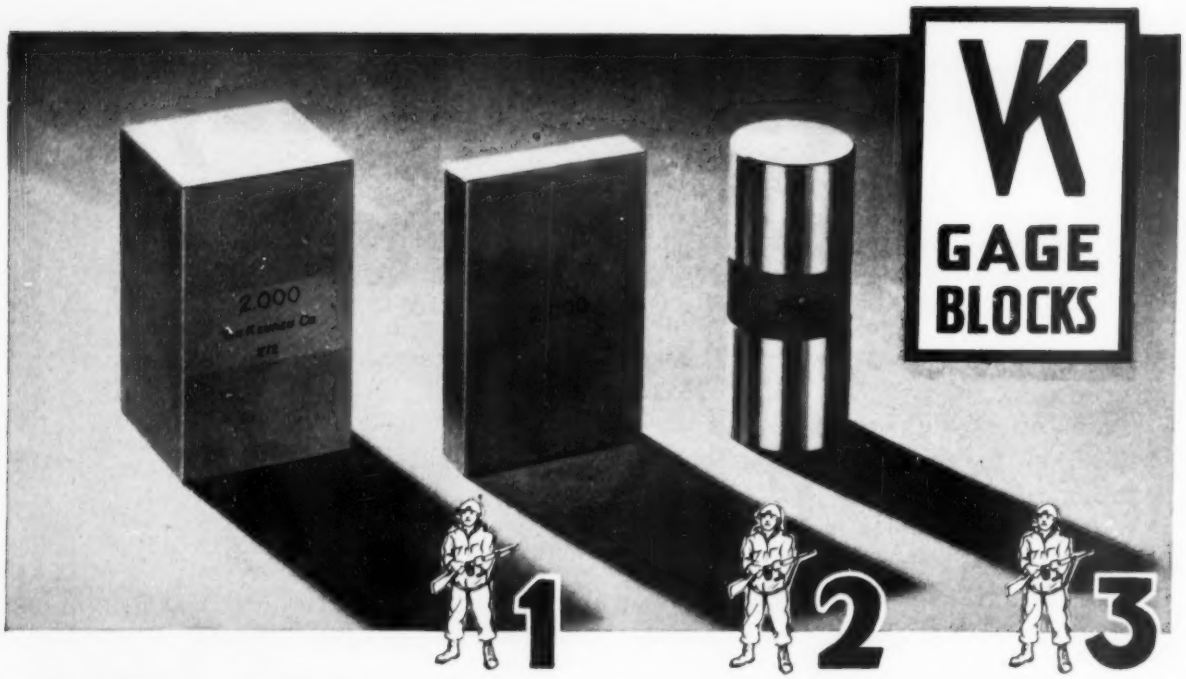


Circles show location of positioning device for both headstock and table travel. Automatic control of table and headstock movements eliminates time-consuming, fine hand-adjustments in locating work.

Here operator sets up one of the larger workpieces. It will be bored for a 2" diameter hole—tolerances ± .0005".

Builders of the world's finest Horizontal Boring, Drilling and Milling Machines — table, floor and planer types; Hypro Planers, Planer Type Milling Machines and Vertical Boring Mills; and G&L tool accessories.

GIDDINGS & LEWIS MACHINE TOOL CO.
Fond du Lac, Wisconsin, U. S. A.



SOLDIERS THREE... *defending production accuracy*

To meet the requirements of the current defense effort in meeting closest limits of accuracy and protecting production, Van Keuren is currently furnishing three types of gage blocks:

1—SOLID SQUARE MASTER BLOCKS
2—RECTANGULAR REFERENCE GAGES
3—MICROGAGES

Shipment on complete sets of any of these three types can be made within 60 days from receipt of order.

VK Solid Square Master Blocks are accurate to .000004" per inch of length and are designed for laboratory use or to standardize all shop dimensions. Large wearing surface; perfect parallelism. Available in 85- and 41-block sets and guaranteed unconditionally for 5 years not to exceed .0001" in wear.

VK Rectangular Reference Gages are guaranteed accurate to .000008" per inch of length and are designed for the inspection department or precision set up work. They are available in 81-block and 33-block sets. Individual blocks from either of these sets can also be furnished. Certificate of size is also furnished with each set.

VK Microgages are accurate to plus .000012", minus .000008" per inch of length and are designed as working gages for shop use . . . to put accuracy at the machine. Wearing surface is 40% greater than that of rectangular gage blocks, hence their long-wearing quality. Available in several set combinations.

Van Keuren Gage Blocks are fully described in Catalog and Handbook No. 35, yours for the asking by writing: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

VK

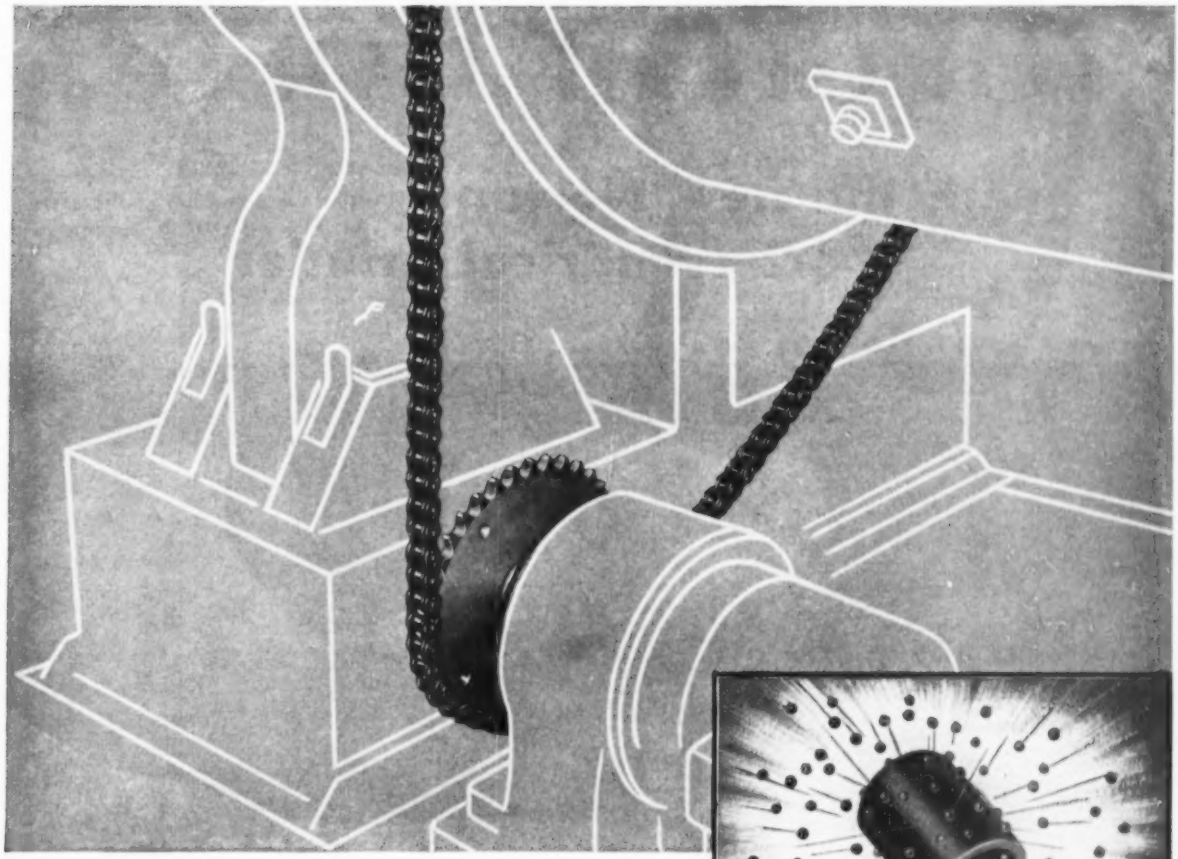
34th YEAR

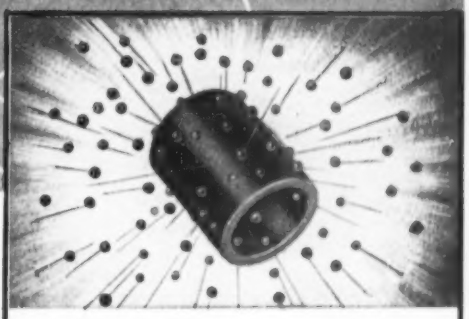
THE *Van Keuren* CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires

There's EXTRA LIFE built into LINK-BELT roller chain





Look for the distinguishing darkened rollers. Thousands of tiny steel balls hammer the metal—"cold work" each roller . . . pay off in extra fatigue life . . . added ability to withstand shock and impact of today's heavier loads.

Shot-peened rollers are just one of many engineering extras you get from LINK-BELT

WHETHER it's for drive or conveyor service, every Link-Belt Roller Chain gives you a performance bonus. In addition to shot-peened rollers, lock-type bushings multiply capacity to withstand shock loading. And closer heat-treat control, rigid testing and thorough inspection pay off in greater uniformity . . . extra years of life. Link-Belt Precision Steel Roller Chain is built in single or multiple widths, ⅜" through 3" pitch. Double pitch 1" through 3". A call to your nearby Link-Belt office will bring you prompt, expert service. Send for Engineering Data Book No. 2457.

13,119-A

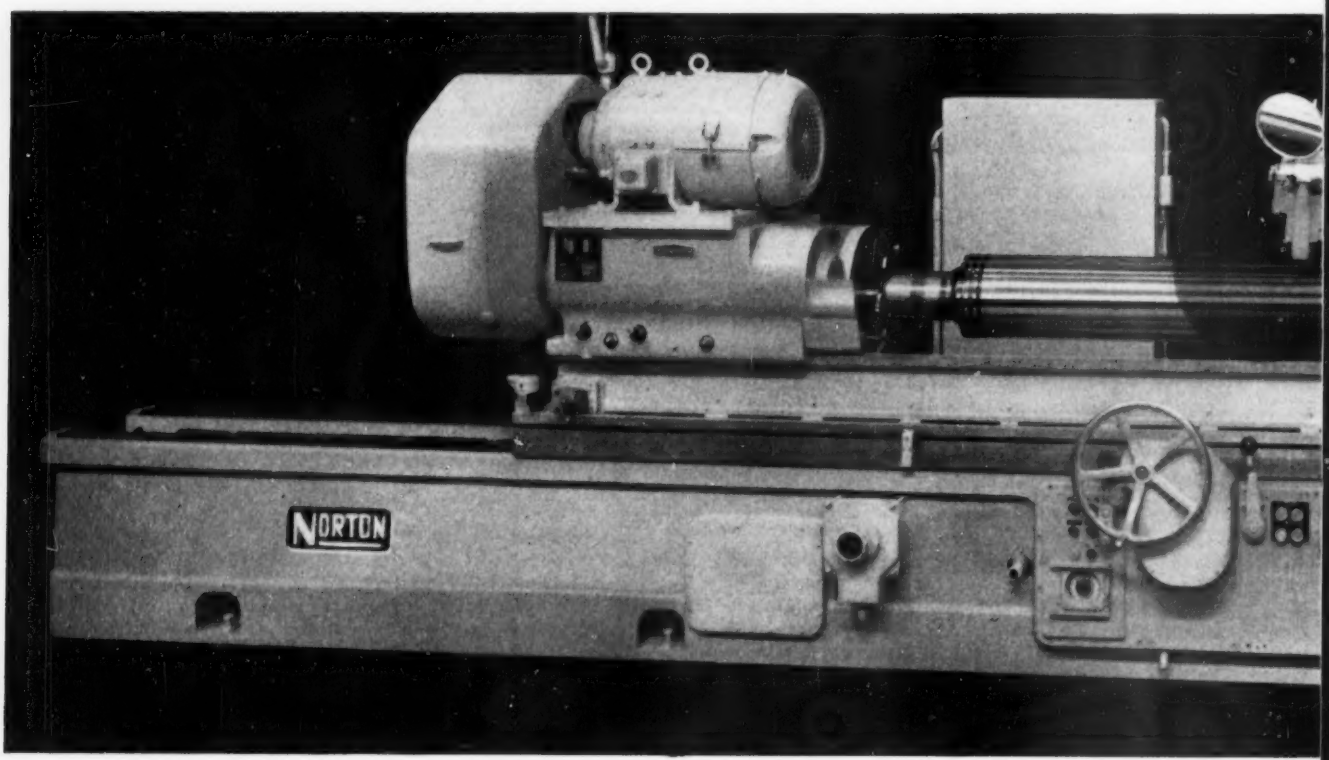
LINK-BELT

ROLLER CHAIN & SPROCKETS

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities.

You get bigger profits...the real "TOUCH OF GOLD"

with the new Norton C-2 cylindrical grinder

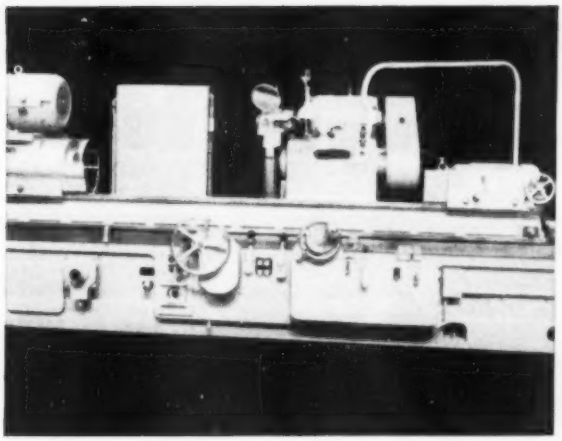


Faster cutting . . . quicker set-up . . . easier operation

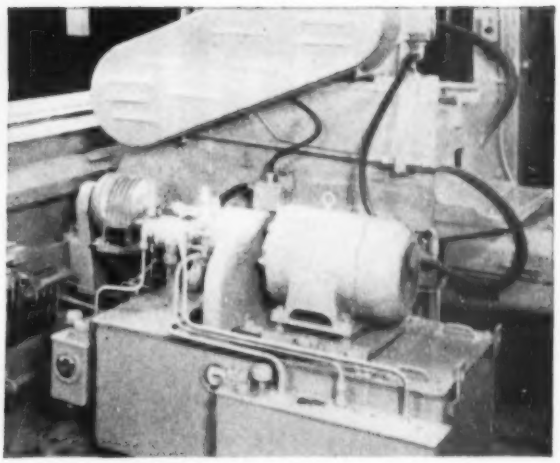
This is the kind of grinding machine you expect from Norton — one that's tops for accuracy, production rate and ease of operation.

The new C-2 gives you more heavy production because it works more of the time — and works faster and easier. When used as a semiautomatic all your operator does is set it up and push the button for automatic grinding to exact size and finish.

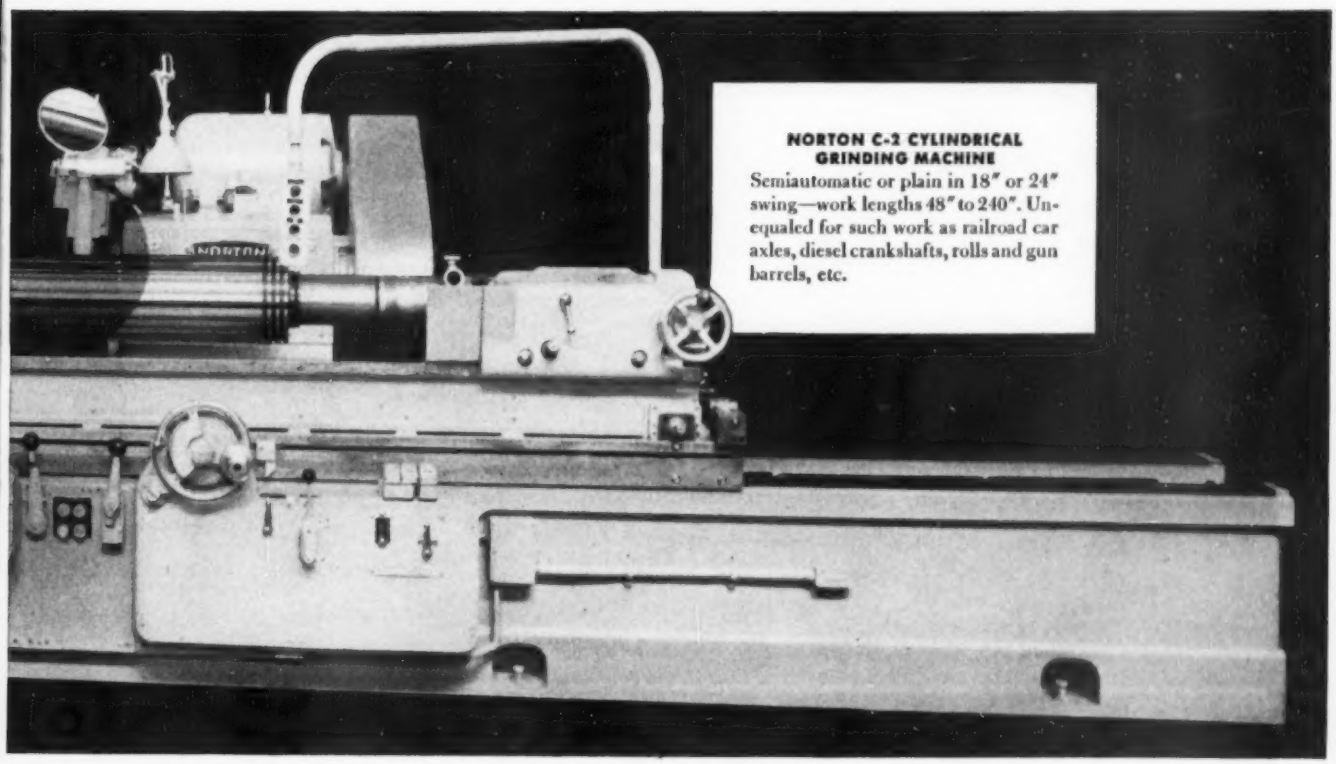
Remember, only Norton offers you such long experience in both grinding wheels and machines — assuring you the



EASY TO SET UP AND OPERATE. All controls in front for minimum set-up time, quick change-over and no reaching by operator. Graduated feed hand wheel indicates feed. "Click-counter" signals each .0001" reduction in work diameter. Table-truing and grinding speeds may be pre-set, and obtained by selector lever.



EASY TO MAINTAIN. All maintenance points on outside. Pumps, motors, filters, lubrication valves and all reservoirs easily accessible. Electrical controls grouped for easy inspection and enclosed for protection.



NORTON C-2 CYLINDRICAL GRINDING MACHINE

Semiautomatic or plain in 18" or 24" swing—work lengths 48" to 240". Unequaled for such work as railroad car axles, diesel crankshafts, rolls and gun barrels, etc.

. . . less down-time

value-adding, "Touch of Gold" that means more and better products for less cost.

Get ALL The Facts. Your Norton Representative will be glad to give you further details on the new C-2, and to discuss your grinding problems or, write direct to NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize Modernize With **NEW**

NORTON

GRINDERS and LAPPERS

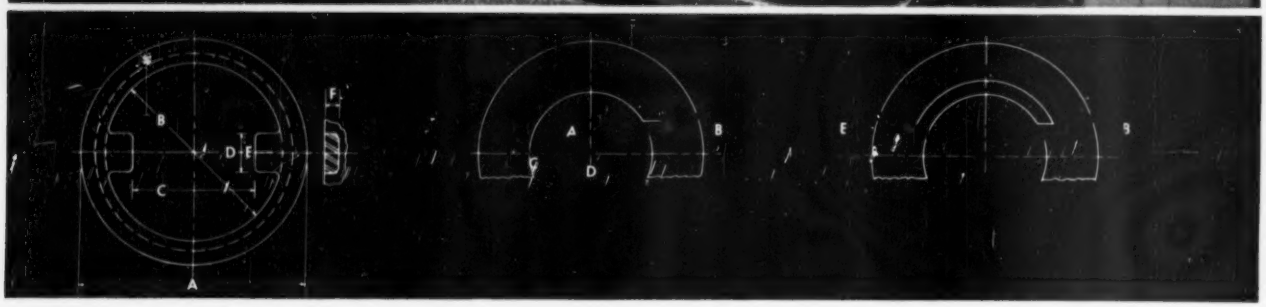
Making better products to make other products better

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

PRODUCTION TIME

PRODUCTION DATA

PART — QUICK CHANGE CLAMP COLLAR
MATERIAL — SAE 4615.
CUTTER — ¼ dia. — 2 lip — HSS endmill.
SPINDLE SPEED — 600 rpm — (80 sur. ft./min.)
LOT SIZE — 25 to 50 pcs.
CYCLE TIME (FLOOR TO FLOOR) — 15¾ minutes.
PREVIOUS CYCLE TIME — 34 minutes.



(A) 6" (B) 4⅝" (C) 3¼"
(D) —1" + ±.000 (E) —1" + ±.005 (F) ⅜"

OPERATION 1 — Rough mill one side of tongue.
PROCEDURE — Offset spindle slide radius (A), set rotary head to angle (B), feed table to workpiece centerline (C to D).

OPERATION 2 — Rough mill radius section between tongue.
PROCEDURE — Rotate head from angle (B) to angle (E).

REDUCED BY 53%!

Rotary Head Milling Machine simplifies method and cuts costs on still another production job

Here's the completed workpiece together with two pieces of waste.

IN production of this Quick Change Clamp Collar, considerable savings were effected by using a versatile Kearney & Trecker No. 2 Model D Rotary Head milling machine.

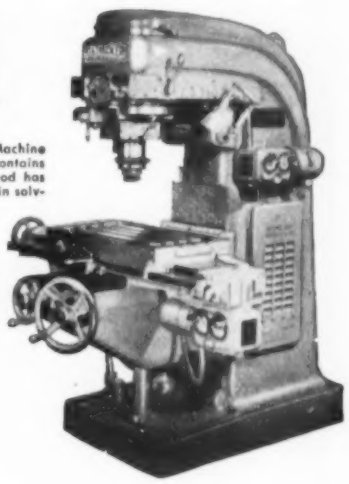
The radius of the piece was produced merely by offsetting the spindle slide and rotating the machine's head. The job was done faster, more accurately than would be possible with any other method.

Practically no other standard machine can mill these parts without a change in setup and cutters, maintain accuracy, yet complete the job in less than 16 minutes!

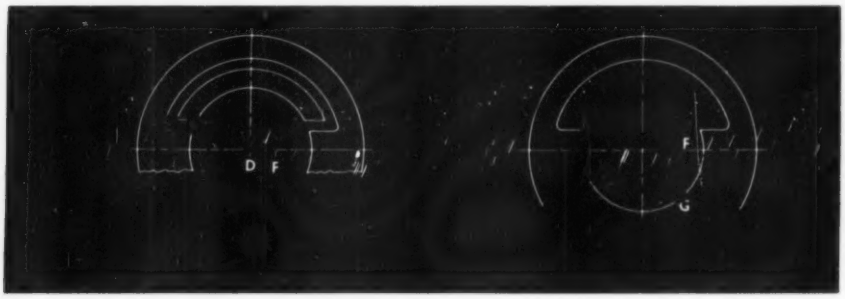
For details of this operation, see the diagrams below. Note: Model D's table and saddle movements are independent, will not affect the radius setting—think what that means not only to this job, but also in terms of a wider range of applications for other work.

Here's the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production, die, forging and metal pattern milling problems. It's yours for the asking.

Address requests for booklet to Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS



OPERATION 3— Rough mill one side of opposite tongue.
PROCEDURE—Feed Machine table from (D) to (F).

OPERATION 4— Rough mill end of tongue.
PROCEDURE—Feed machine saddle from (F) to (G).

OPERATION 5 — Rough mill second half of inner contour.
PROCEDURE — Repeat Operations 1 through 4, working area to be in the lower half of opening.

OPERATION 6 — Finish mill 4⅛" dia., end of tongues to 3¼" dimension and width of tongues to 1" +.000 −.005.
PROCEDURE — Reverse sequence of Operations 1 through 5.

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY

LATHE, BUT . .

- It sets up *fast*—like a turret lathe.
- It uses turret lathe tools.
- It machines turret lathe lots, on an automatic basis, without the usual penalties of automatic operation.
- It will combine certain operations not possible in accepted turret lathe practice, thus reducing machining time.
- It will automatically change speeds and feeds under cut to assure more efficient performance of your cutting tools.
- It requires less skill to operate —and in many cases one man can handle two or more machines.

. . . it is the Warner & Swasey 1AC Single Spindle Automatic Chucking Machine.

With today's emphasis on greater production, there are undoubtedly certain jobs in your shop that could be machined faster and better on the 1AC. Call in your nearest Warner & Swasey Field Engineer— he'll show you exactly how it can improve your operation.

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

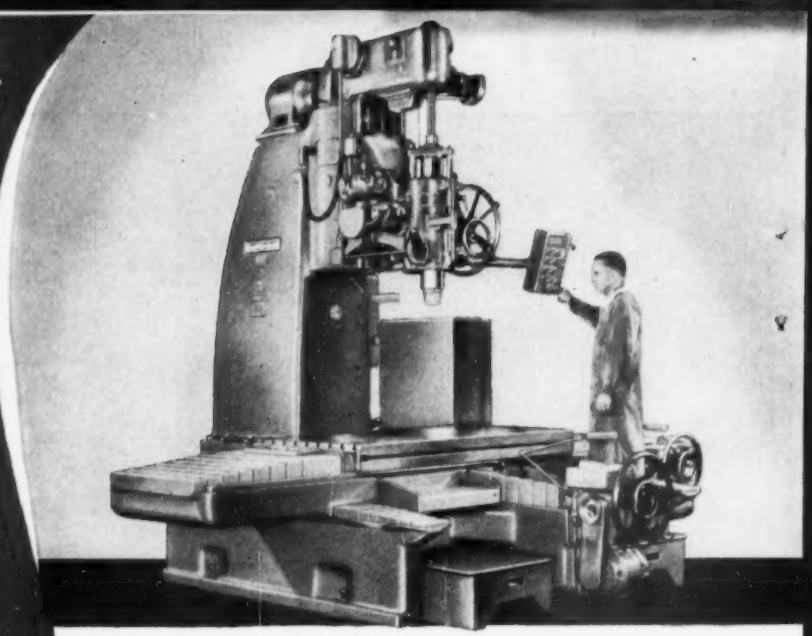
Whatever Your Needs...

THE

PRATT & WHITNEY MAN

who calls on YOU

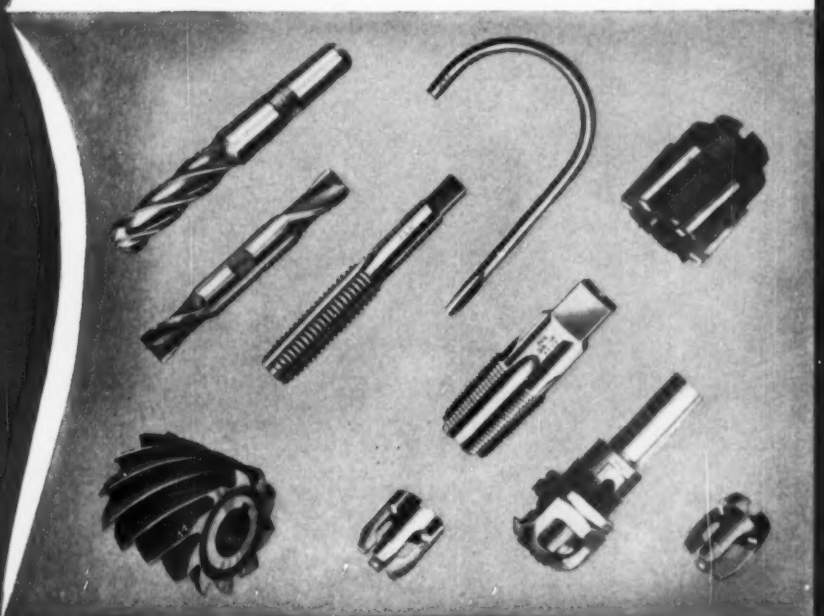
Knows His Stuff!



If it's Machine Tools

like the Pratt & Whitney 4E *"Electrolimit"* Jig Borer

You'll be making the "First Choice for Accuracy" when you call in Pratt & Whitney. The P&W Representative is a trained specialist in machine tools . . . machine tools that will bring tool room standards of accuracy to your production line. Don't settle for less when straight-line, factory-direct skill and knowledge are yours for the asking.

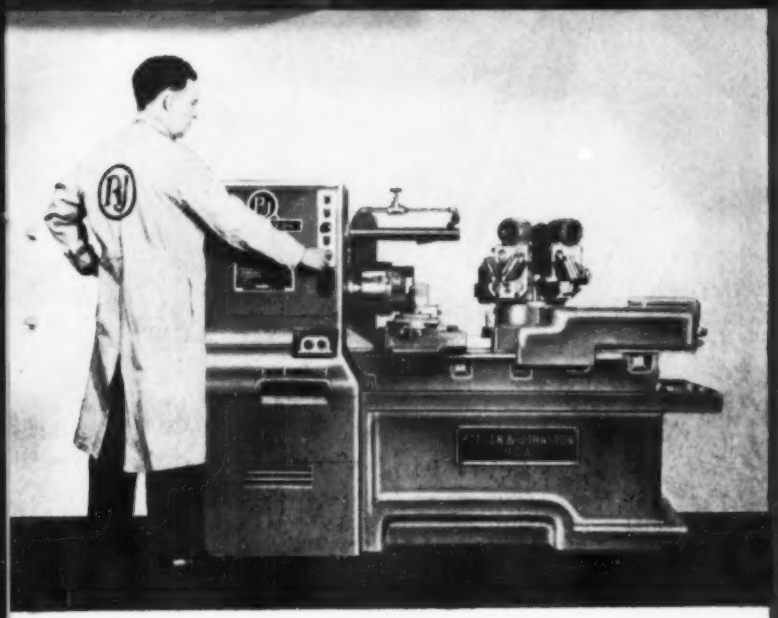


If it's Cutting Tools

there's the best for every job in the complete P&W Line

Talk to the man who talks your language . . . the Pratt & Whitney factory-trained cutting tool specialist. In direct contact with the factory and the rest of the P&W family of specialists, he places a wealth of knowledge at your disposal. From start to finish, you're way ahead of the game when you call in Pratt & Whitney.

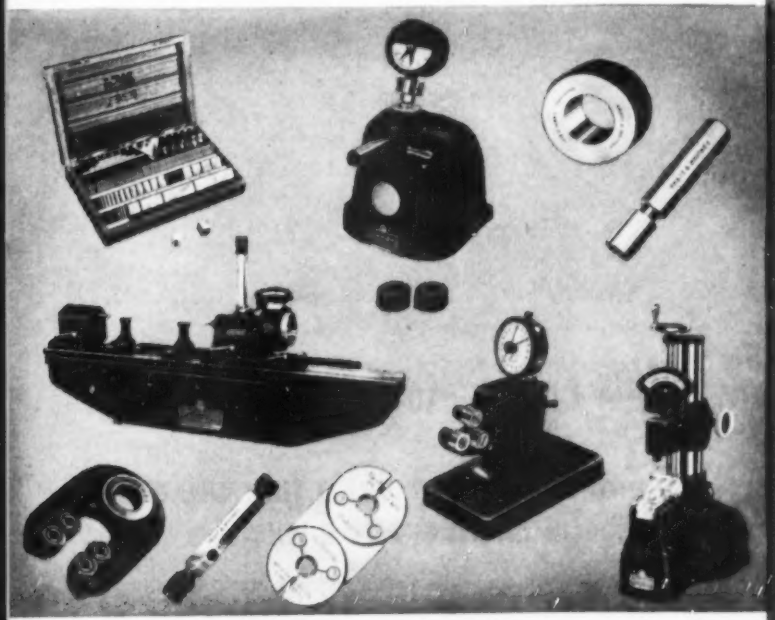
Pratt & Whitney Branch Offices maintain comprehensive



If it's Automatics PLUS Tooling

like the Potter & Johnston Automatic Turret Lathe

When profitable production calls for a high output of precision parts, you can help yourself to greater speed, accuracy and economy with a call to your Pratt & Whitney-P & J Representative. Thoroughly experienced in practical manufacturing problems . . . and working closely and constantly with our factory engineers, he'll make sure that you get the P&J Machines *plus* P&J Tooling best for your specific needs.

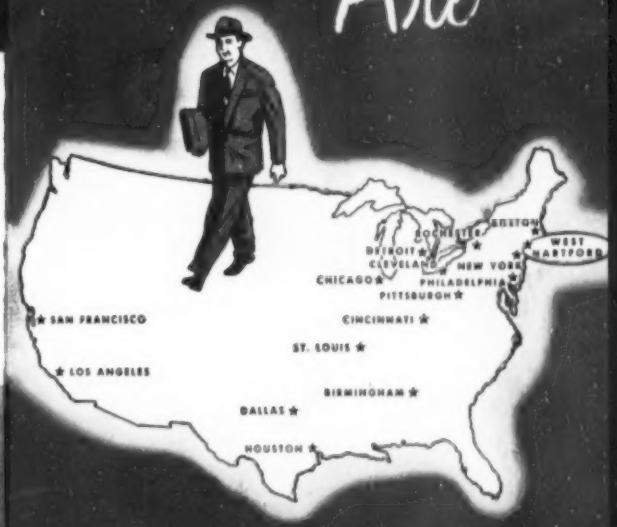


If it's Gages to maintain the master and working standards in Industry

The Pratt & Whitney Man you'll talk to is a Gage specialist who represents a Company which manufactures a great variety of gages and gaging equipment. When he recommends the *right* gage for *your* job, you can be sure he's thinking about *your* problem . . . not merely trying to sell the only thing he has to offer from a limited line. In every gaging problem, there's one type of P&W Gage that does the job better than any other . . . and that's what he'll recommend.

stocks of regularly listed Cutting Tools and Gages.

Wherever You Are



THE

PRATT & WHITNEY MAN

is available WHEN you need him

. . . because his works out of the Pratt & Whitney Branch Office and Warehouse conveniently located near you, his expert advice is as near as your telephone . . . and comprehensive stocks of Pratt & Whitney Cutting Tools and Gages are available to meet your immediate needs.

PRATT & WHITNEY
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WEST HARTFORD 1, CONNECTICUT, U. S. A.

First Choice for Accuracy

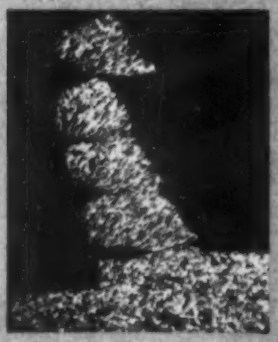
Grit Magnified 250 Times

An ANT could carry away this cutting tool

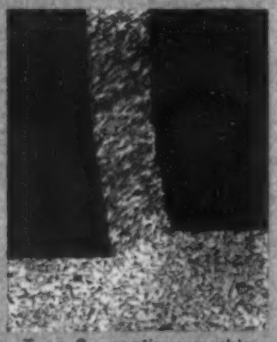
WHICH LED TO NEW CONCEPT THAT CREATED CINCINNATI GRINDING WHEELS

■ The tiny grinding grits shown with the ant is the core of an entirely new approach in grinding wheels. For Cincinnati Milling has proved, beyond doubt, that the grinding process is a true metal cutting process. The grinding grits do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

BASIC CHIP TYPES:
Photomicrographs of cross sections taken thru pa:tially formed chips obtained under various conditions in machining operations such as turning, milling, planing and broaching.



Type 1—discontinuous or segmental chip.



Type 2—continuous chip without built-up edge.

Type 3—continuous chip with built-up edge.

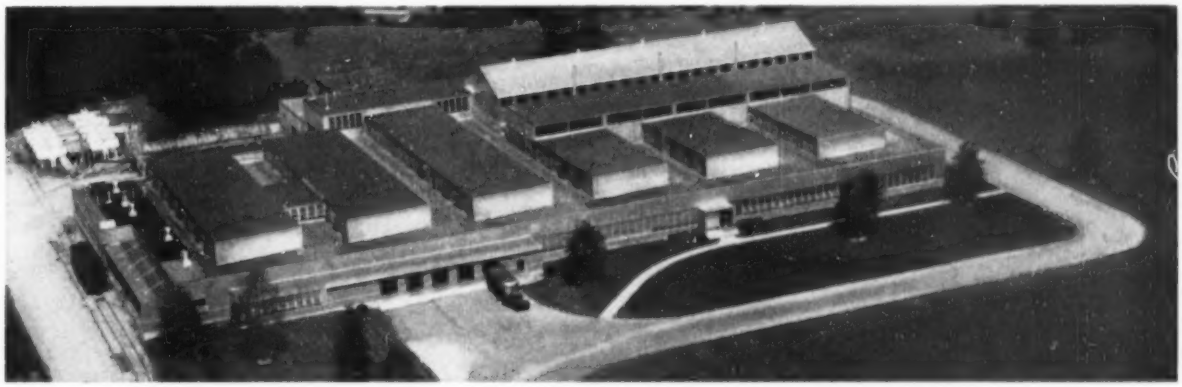
This new concept is not based on hasty conclusions. It represents 25 years of research by The Cincinnati Milling Machine Co. in chip formations, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and center-type machines.

This new concept is the beginning of a new approach to grinding wheels—the development of the wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the world's largest background of research and experience in metal cutting operations.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. They can serve you well.

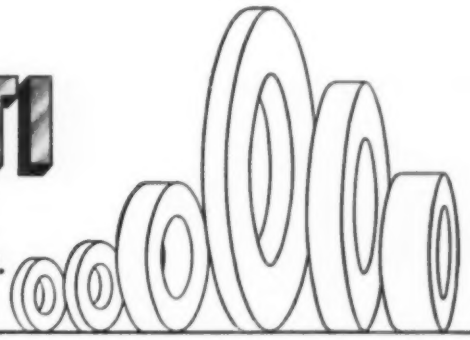
We'll be glad to show you how to get the most out of Cincinnati Grinding Wheels. For a demonstration in your own shop—on one of your own machines—contact us at once. Write, wire or telephone the Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

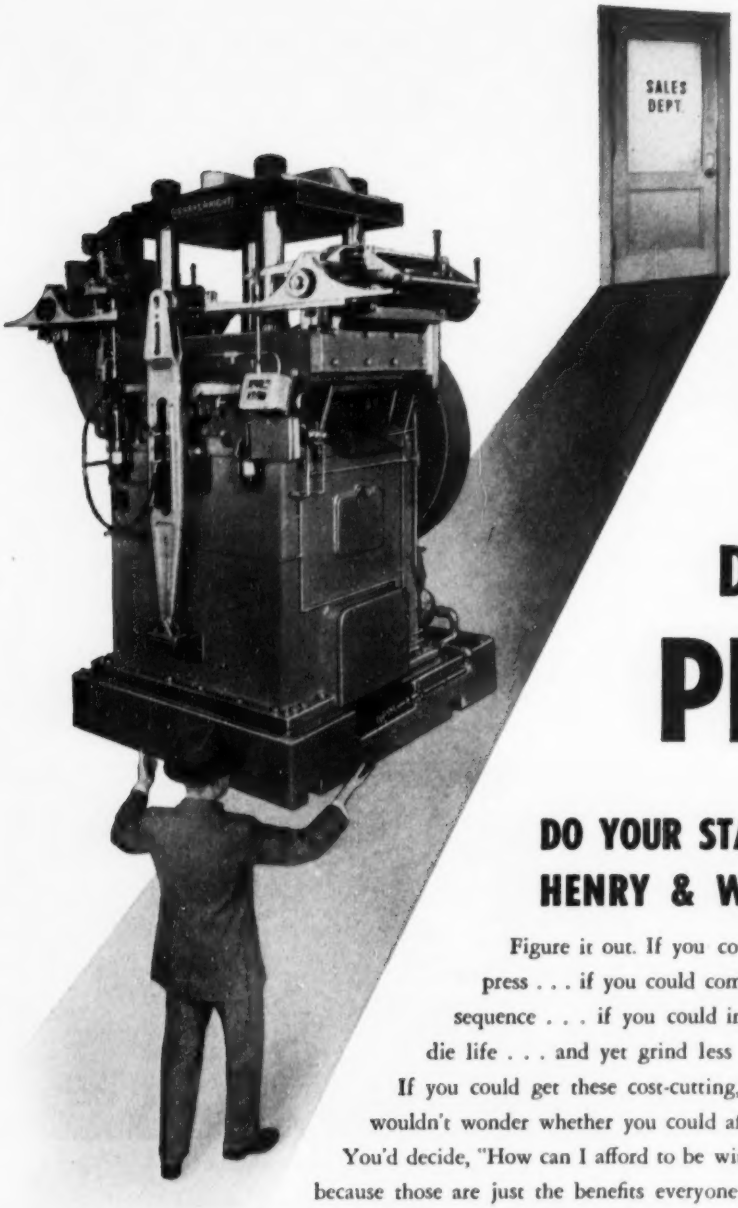


Cincinnati Grinding Wheels are manufactured in this new, completely modern plant.

FREE BOOKLET. Now available to industry is a new booklet entitled "A New Concept In Grinding Wheels." It contains valuable information for everyone interested in grinding operations. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

CINCINNATI
Grinding Wheels
THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio





RUSH YOUR SALES DEPARTMENT A PRICE CUT

DO YOUR STAMPING PROGRESSIVELY ON HENRY & WRIGHT DIEING MACHINES

Figure it out. If you could produce dozens of different jobs on one press . . . if you could combine separate operations into one progressive sequence . . . if you could improve accuracy, get higher speeds with longer die life . . . and yet grind less metal off the die to sharpen it . . .

If you could get these cost-cutting, labor-saving, inspection-reducing benefits, you wouldn't wonder whether you could afford a Henry & Wright Dieing Machine now. You'd decide, "How can I afford to be without it now?" Well, let's talk serious business, because those are just the benefits everyone gets with Henry & Wright Dieing Machines —and, brother, how the Sales Department will love that price cut you'll give them.

HENRY & WRIGHT DIEING MACHINES . . . A PROFIT WITH EVERY STROKE

Only the best is good enough

H&W

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

HARTFORD 1, CONNECTICUT

NEW CATALOG Get up-to-the-minute facts on Dieing Machines — capacities range from 25 tons to 2500 tons. Write Henry & Wright, 481 Windsor St., Hartford, Conn.

GARDNER

precision disc Grinders

Grinding TWO Parallel Sides of 114 sq. in. Steel Disc In ONE Operation

WORK DATA

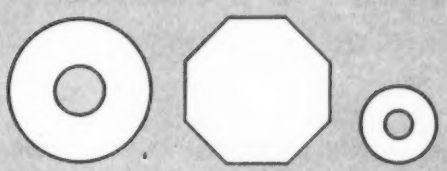
OPERATION—Grinding parallel sides of test billets to produce finished surface before etching for steel analysis.

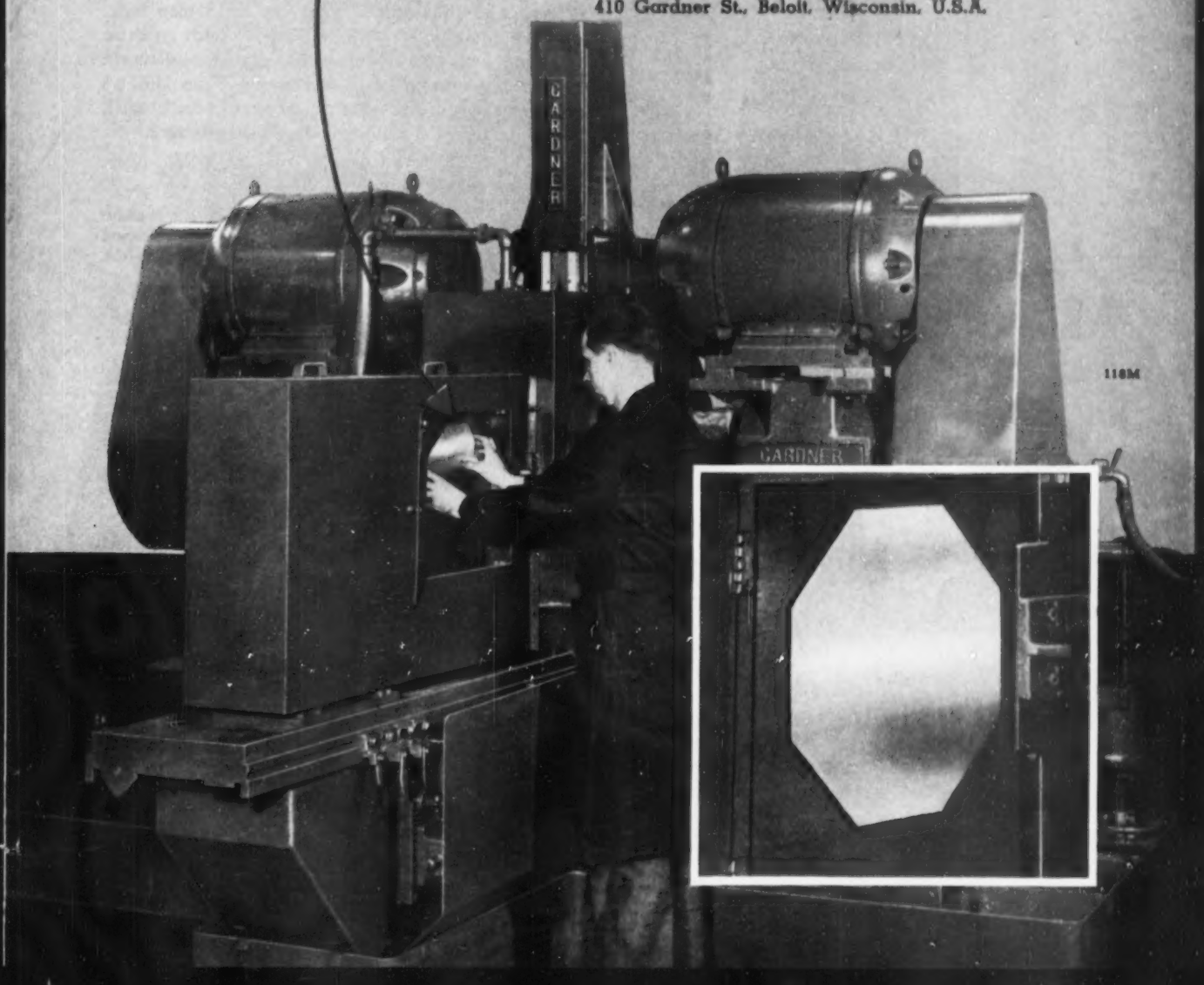
STOCK REMOVAL—3/16" to 1/4" overall.

TOLERANCE—.006" to .008" for uniformity. .003" to .006" for parallelism.

Consult Gardner about your flat surfacing problems. Production estimates and tooling suggestions will be furnished from your work prints.

GARDNER MACHINE COMPANY
410 Gardner St., Beloit, Wisconsin, U.S.A.



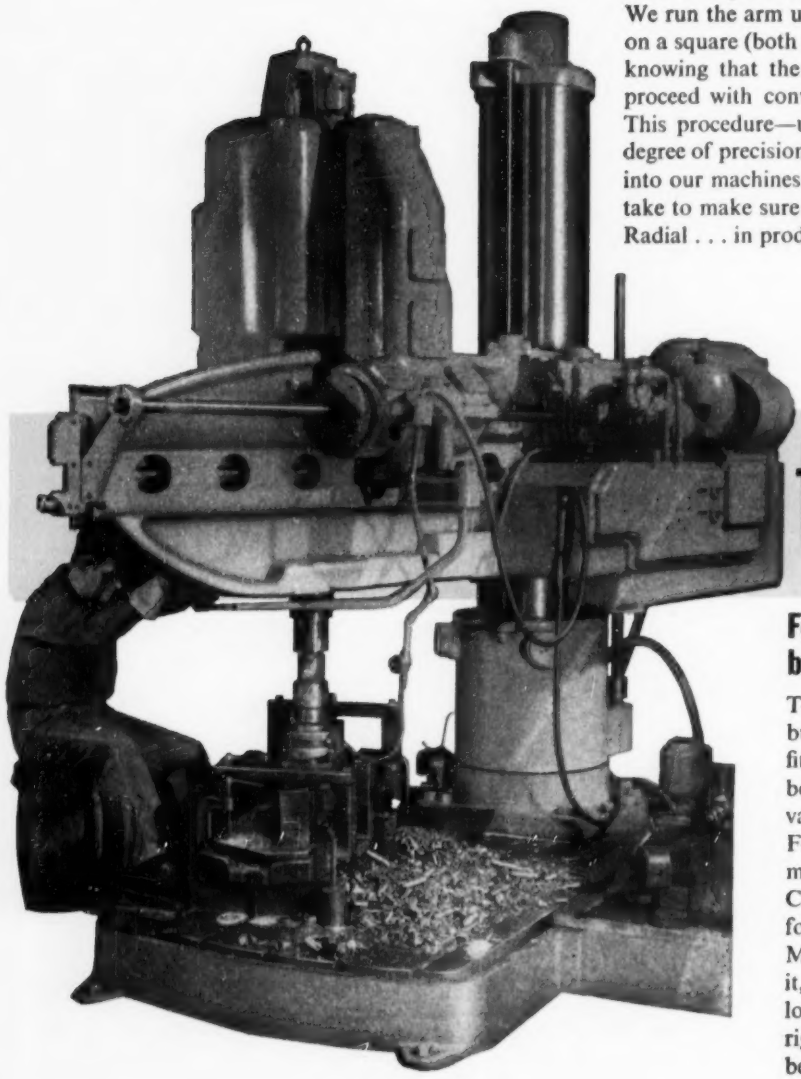


116M

Here's another reason it pays to get a proposal from Fosdick

Fosdick aligns the column

Radial alignment at Fosdick starts with the column. We run the arm up and down with an indicator bearing on a square (both lengthwise and across the base). Then, knowing that the column is square with the base, we proceed with conventional tramming and sweep tests. This procedure—used only by Fosdick—adds an *extra* degree of precision to the extra rigidity we have designed into our machines. It's another example of the pains we take to make sure you get the most out of your Fosdick Radial . . . in production, tool life, finish, tolerance.

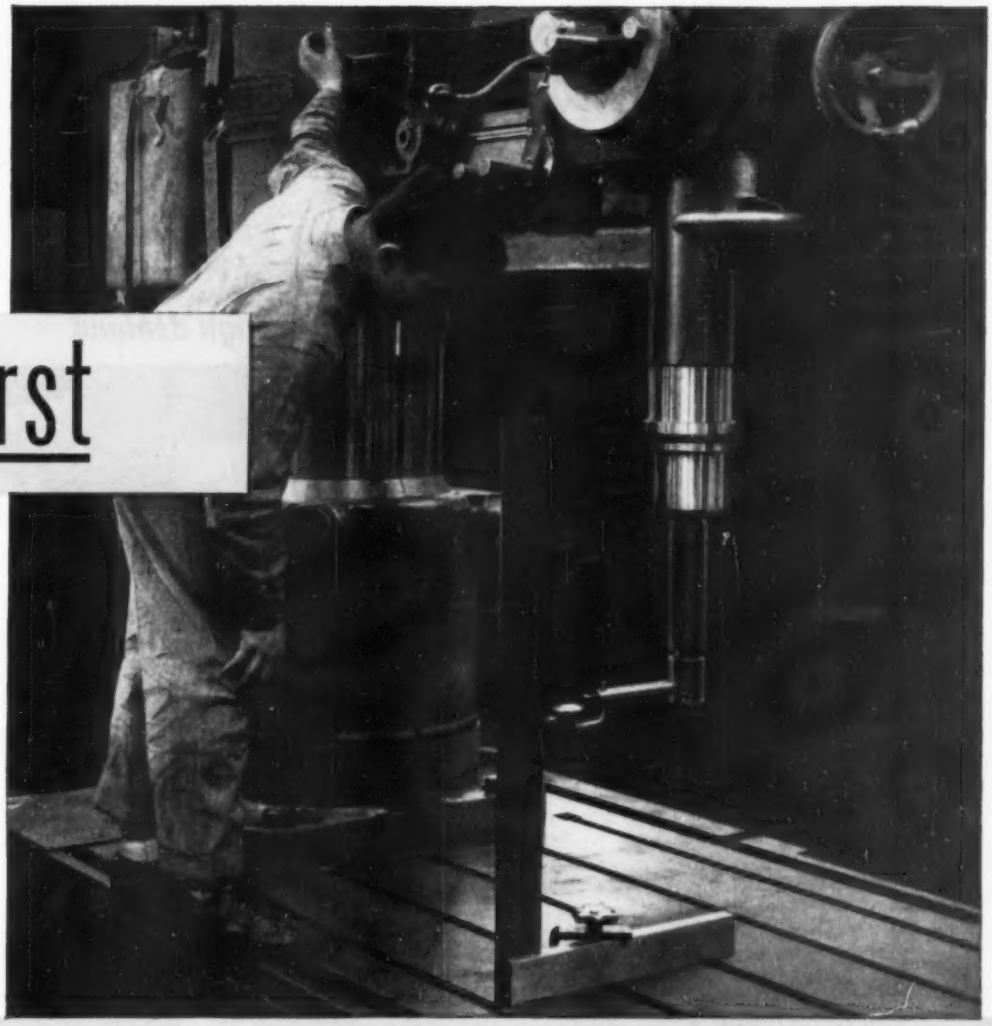


Fosdick Hydraulic Radials are available with 3' to 8' arms, 11" to 19" columns. For full information, ask for Bulletin HRA.

to give you

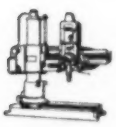
Fosdick takes a "bite" out of boring time at Owen Bucket

Tough cast-steel hinges for clamshell buckets are bored to ± .001" for a press-fit cast iron bushing—then counter-bored for a washer. For this and a variety of other heavy-duty drilling, Fosdick's proposal on a 5' 17" Radial made sense. Now Owen Bucket Co. of Cleveland gets 10 pieces in the time formerly needed to produce 7. As Frank Matisak, General Superintendent puts it, " . . . now we can do more pieces with longer tool life—this machine is more rigid, giving us closer tolerances and better finish."



First precision production like this

Need Drilling Equipment? Get a Proposal from Fosdick!



Radial Drills

Jig Borers

Sensitive and Upright Drills

Sensitive Radial Drills

Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

6 Advantages of the GOLIATH

High Speed Lathe

- which have brought it so quickly into high demand

1 a - d **Quick chucking device** (German Patent)

Short-tapered spindle nose acc. to DIN 812 allows change of face plate, chuck, dog plate etc. in far less time than is required in the case of any other lathe. It will take you no longer than you need to read these lines . . . 6 to 10 seconds at most.

2 **Control of 12 spindle speeds trough only two levers**

You need but operate a single cross handle and the back gear lever, to control 12 spindle speeds, row I: 24 - 1000 r.p.m., or row II: 32 - 1400 r.p.m.

3 **Control of all threads and feeds through a single control block**

No tumbler yoke. All gears hardened and ground and with oil bath lubrication. Coarse thread 1:8. Multiple thread cutting device.

4 **Inverted V-way bed**

Novel bed construction. Chip slide to the rear. Bed reinforced through diagonal ribs. Full-length box type support. Protected V-ways.

5 **Automatic apron release**

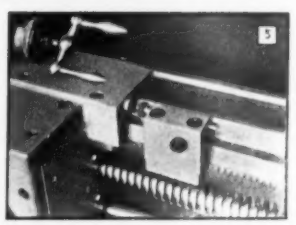
Release accuracy of .0004" guaranteed by patented drop-worm device. No recoiling of carriage.

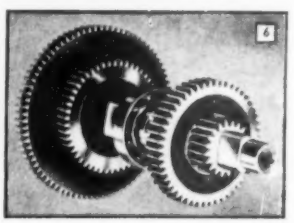
6 **All sliding wheels and shafts with (K) Profile**

For more than 10 years we have been using the patented triangle (K) profile instead of hexagon spline shafts. This offers additional safety, as displacing of wheels is impossible while machine is running, and extends lifetime of lathe.

Specifications:

Max. swing over bed	18½" or 19¾"
Max. swing over cross slide	8¼" or 9⅞"
Distance between centers	30" / 40" / 60"
Motor	7,5 or 10 H.P.

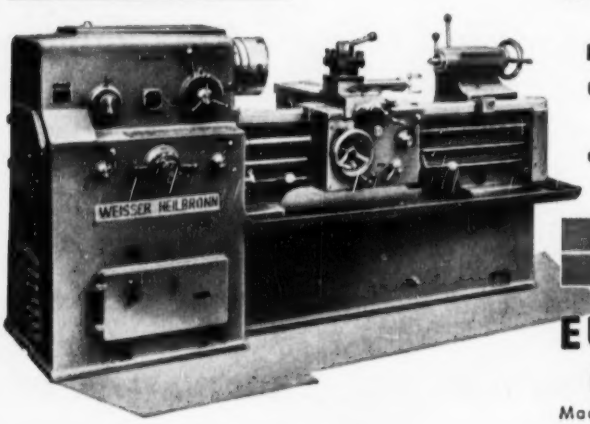




Advise and service through our authorized expert agents.

Write for English prospectus No. 2122 to be sent to you without obligation.

Always Best! Always Weisser!



Representatives and Service:

USA: Guthery Machine Tool Corp., 130 West 42nd Street, New York 36, N. Y. Telephone: CHickering 4-2820.

Canada: Transocean Machine Company Inc., 1170 Drummond Street, Montreal P.Q. Telephone: UNiversity 6-3304.

WEISSER HEILBRONN

EUGEN WEISSER & CO. KG.

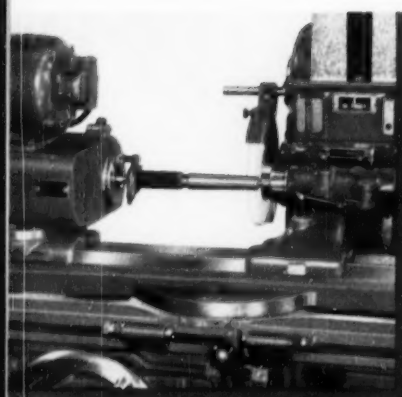
HEILBRONN / NECKAR (Germany)

Machine Tool Manufacturer – Salzstrasse 79/83 and 128/130

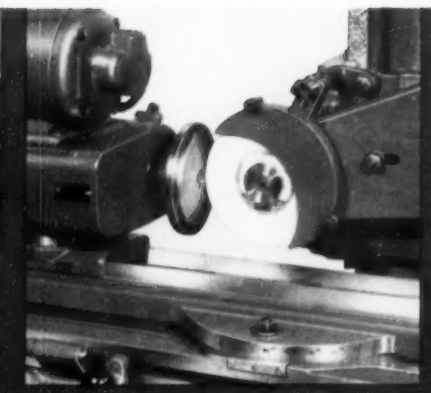
HIGH PRECISION

toolroom
grinding
equipment

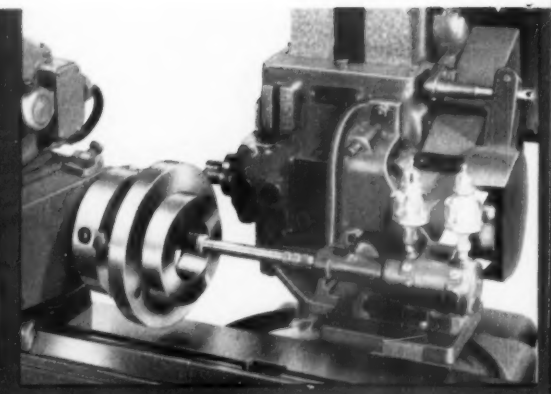
Brown & Sharpe



Taper Cylindrical Grinding



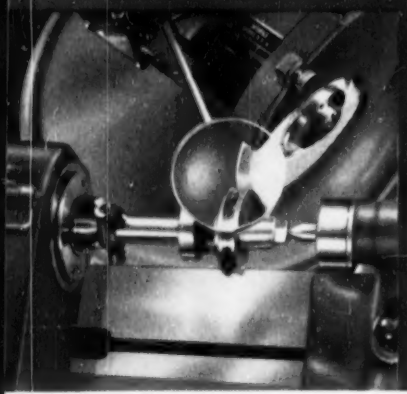
Face Grinding



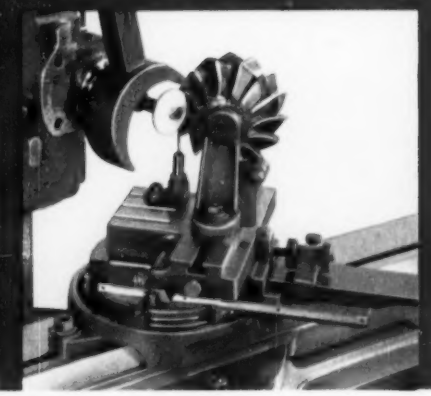
Internal Grinding

"MASTER" of all your toolroom grinding

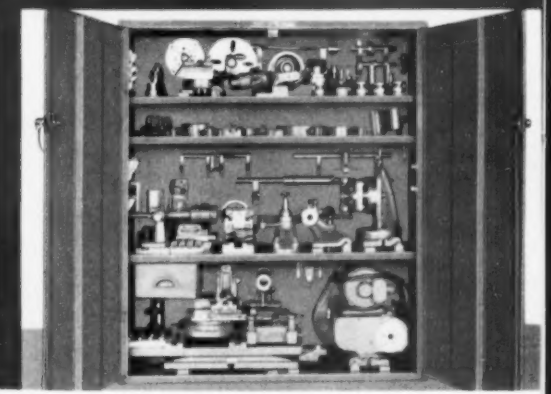
Circular Form Tool Grinding



Radius Grinding Concave Milling Cutter

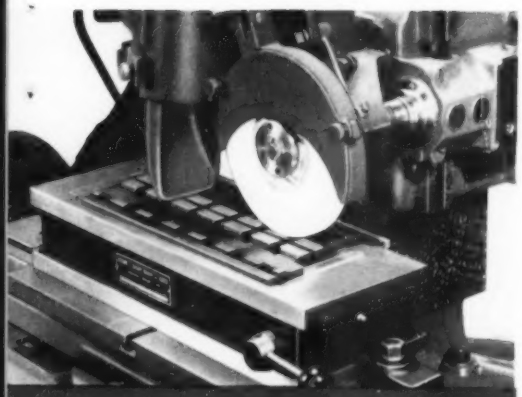


Standard and Optional Equipment Cabinet



Brown & Sharpe

The No. 13 Universal and Tool Grinding Machine



Surface Grinding

With the No. 13, you can handle the broad range of precision grinding jobs usually encountered in tool and die shops, research laboratories, cutter and tool maintenance departments, and toolrooms. Outstanding among many features giving broad utility are the machine's swivel-mounted table, headstock, spindle-slide-upright and eye-level vertical adjustment. Three wheel speeds, together with many headstock and table speeds assure fine finish and efficient grinding on all work. A wide selection of optional equipment, as shown in several of the illustrations, also increases the No. 13's work-capacity. It will pay you to investigate all the advantages of this compact, easy-to-operate, most versatile of all Brown & Sharpe Grinding Machines . . . the No. 13.

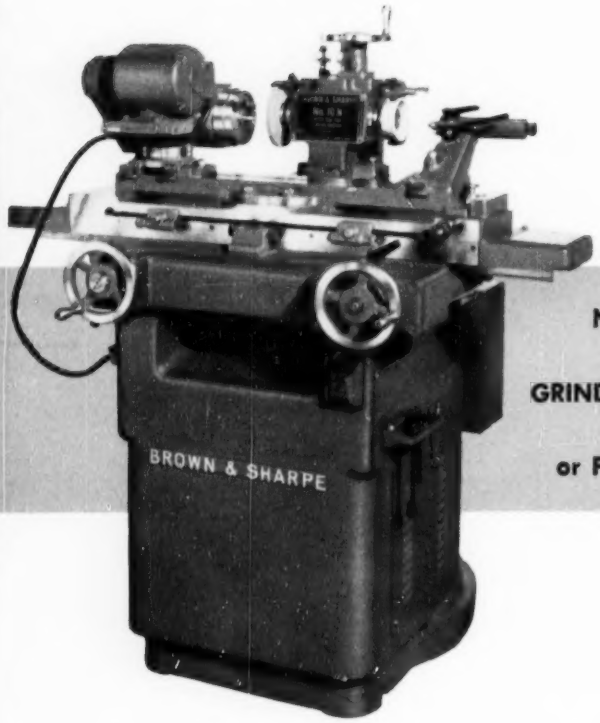
BROWN & SHARPE

Capacity:
24" length
8" swing

For Precision Cutter and Tool Sharpening that Makes Your Production Equipment "Pay-Off"!

No. 5 CUTTER AND TOOL GRINDING MACHINE

Here's a high quality cutter and tool grinder that combines economy of investment, operation, maintenance, and floor space. On small to average size cutters under 6" dia., the No. 5 assures precision sharpening without excessive equipment investment. It's an ideal machine for "on-the-spot" cutter grinding as well as for cutter maintenance departments.



No. 10N CUTTER AND TOOL GRINDING MACHINE with Universal or Plain Equipment

For the full range of cutter and tool sharpening, the No. 10N offers many outstanding features for easy handling and precision performance. It is illustrated here with Universal Equipment which extends its scope to include light cylindrical, internal, and surface grinding operations.

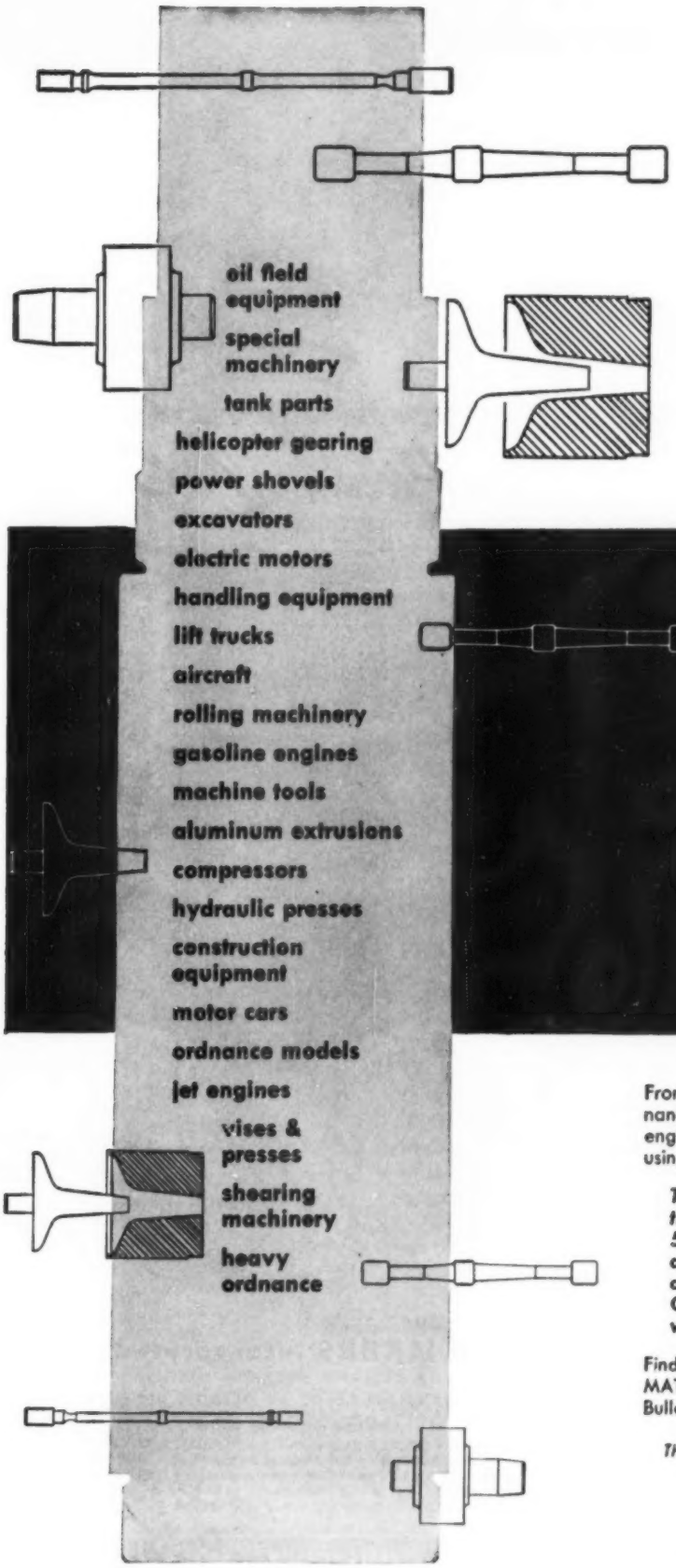
WRITE FOR COMPLETE INFORMATION ON ANY OF THE BROWN & SHARPE PRODUCTS LISTED BELOW.

Brown & Sharpe

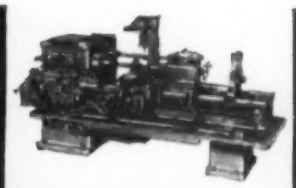
Milling Machines • Grinding Machines • Screw Machines • Cutters
Machine Tool Accessories • Machinists' Tools • Johansson Gage Blocks
Electronic Measuring Equipment • Permanent Magnet Chucks • Pumps

PRINTED IN U.S.A.

BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.



industry cross-section agrees...



Lodge & Shipley COPYMATICS

SAVE time... cost, capital investment, space... manpower

From mammouth construction equipment to ordnance models, from small gasoline motors to jet engines... manufacturers report significant savings using the COPYMATIC.

Time savings run from 22% up to 87%. Production increases from over 100% to as much as 536%! Cost savings range from 40% to an amazing $14,000 in one year. Capital, space and manpower savings are revealed by one COPYMATIC replacing 3 older lathes in one well-known plant.

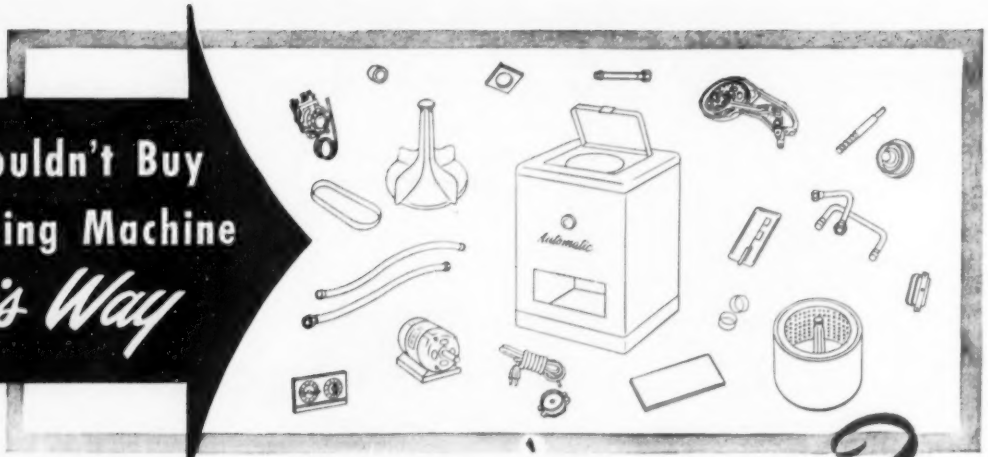
Find out how much a Lodge & Shipley COPYMATIC can save you. Ask for case histories and Bulletin #675.

THE **Lodge & Shipley** COMPANY

3059 COLERAIN

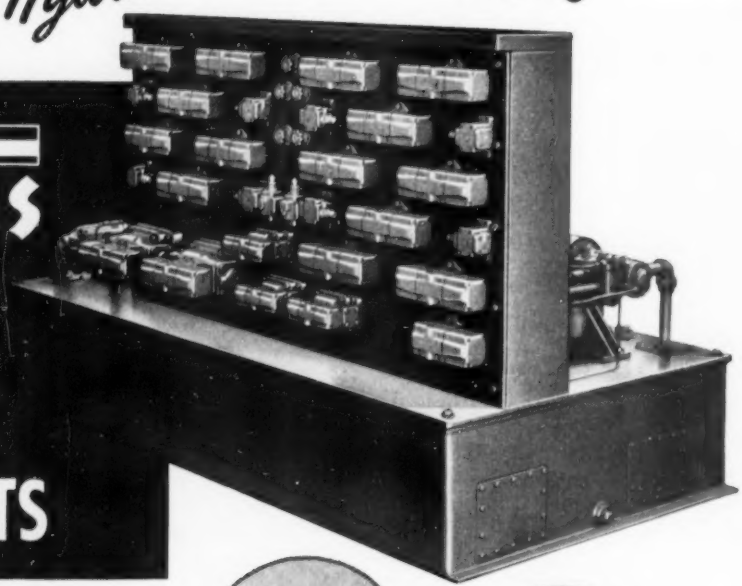
CINCINNATI 25, OHIO

You Wouldn't Buy a Washing Machine *This Way*



Then Why Buy Hydraulics Piecemeal?

VICKERS *Custom-Built* HYDRAULIC POWER UNITS



You would never go to the trouble of buying automatic washing machine parts and assembling them yourself. It would take a lot of time and patience and trouble. For one thing the maker could not risk guaranteeing the finished job. You buy a washing machine as a unit, and want the undivided responsibility of the manufacturer.

Then why buy hydraulics piecemeal when there are so many advantages in a Vickers Custom Built Power Unit? It is built to meet your individual requirements, in a compact, neat, self-contained "package." It includes all necessary pumps, valves, intermediate piping, oil reservoir, motors, controls etc. as well as all hydraulic accessories (oil filters, air cleaners, oil level gauges, fittings etc.). Hydraulic connections are grouped in a convenient manifold.

Hydraulic design is simplified and improved, and you save substantially on installation and maintenance cost. Vickers takes undivided responsibility for the entire hydraulic system and you get the benefit of Vickers skill and experience. These advantages are important to both the machine builder and his customer.

Ask the nearest Vickers factory-trained application engineer to send you new Bulletin 52-45 or to make a personal call.

Improve and Simplify Hydraulic Design

Reduce Installation and Maintenance Costs

VICKERS Incorporated

DIVISION OF THE SPERRY CORPORATION

1410 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices:

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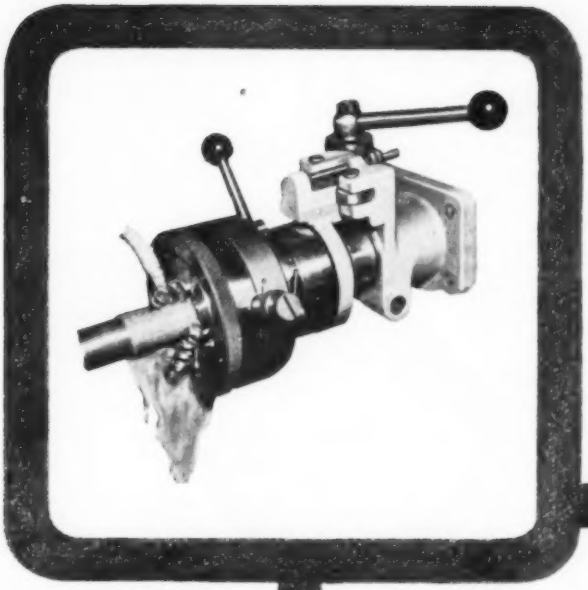
6071

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

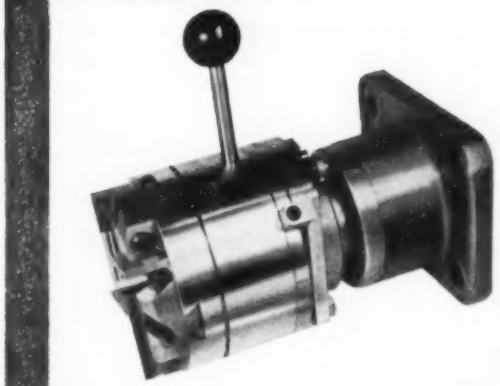


HOLDERS

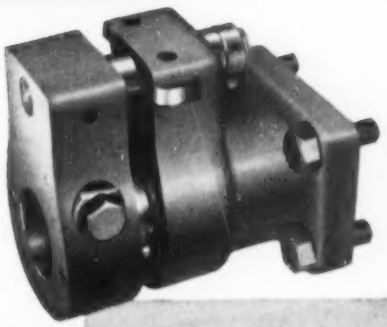
for Jones & Lamson Die Heads

The best of Die Heads deserves the best of holders. With these holders, the extreme accuracy of your J&L Die Heads is reflected in the quality of the threads they produce. Holders for J&L Die Heads are available for most makes of turret lathes. Mail this coupon for a copy of the new illustrated catalog.

LEVER OPERATED DIE & TOOL HOLDERS
for more sensitive control. Eliminate side trimming. Hold reamers, taps and small drills.



FLANGE TYPE HOLDERS
ideal for threading long work that must pass through the face of the turret.



AXIAL FLOAT HOLDERS
for smooth, shock-free starting, better finish threads.

Jones & Lamson Machine Company
502 Clinton Street, Dept. 710
Springfield, Vermont, U. S. A.

Please send Catalog No. 304 "Holders for J & L Die Heads".

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

PS --- *Write for Catalog!* --->

JONES & LAMSON

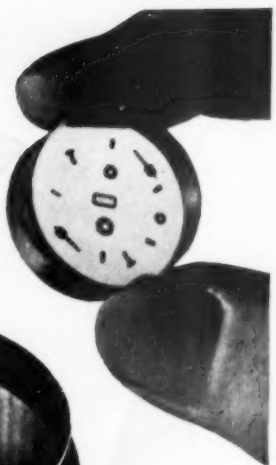
Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE COMPANY
502 Clinton St., Springfield, Vermont, U. S. A.

DIE HEAD DIV.
Dept. 710

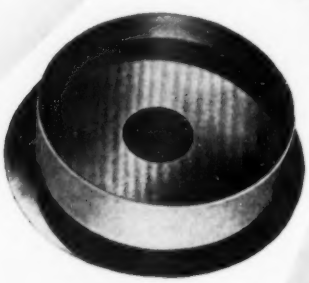
Tiny?

Yes! The No. 11 Blanchard Surface Grinder grinds these ladies' watch gears, pinions and ruby bearings flat and parallel, and to a dimension tolerance of .0002".



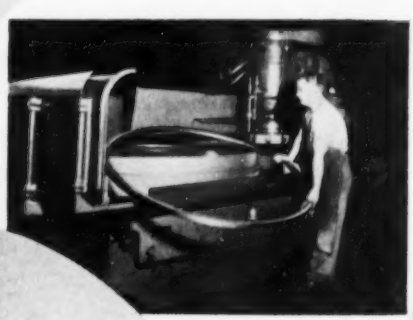
Smooth?

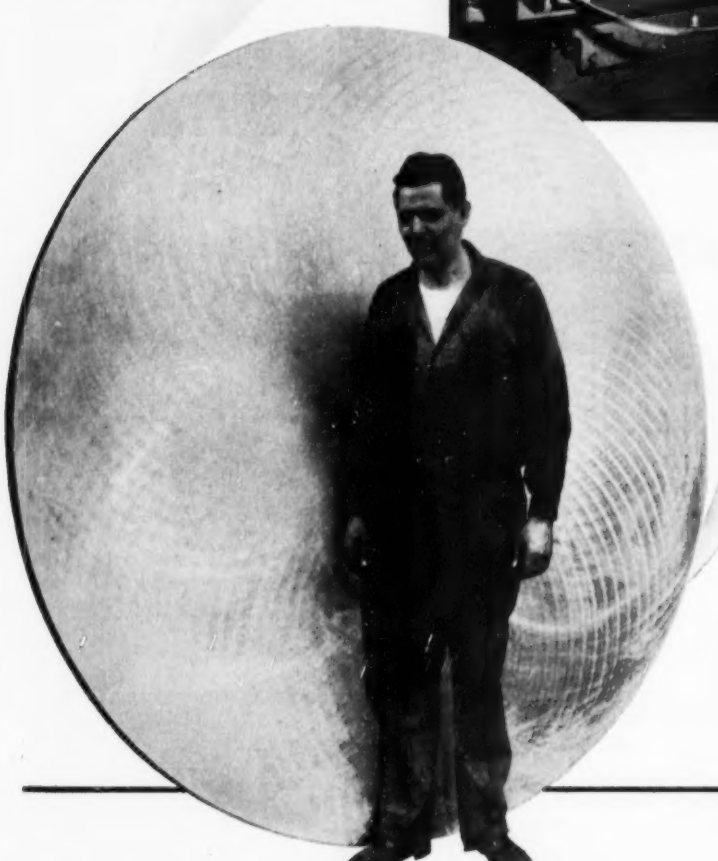
Of course! The Blanchard No. 11 finished this refrigerator plate, seen through an optical flat, to 3 micro inches and flat within 1 light band (.0000118").



Accurate?

Sure . . . and easy, too! This Blanchard grinds 84" forged steel rings flat within .0002", parallel to .0002", dimension tolerance of ±.0005", and with surface finish of 4 micro inches.





Tremendous?

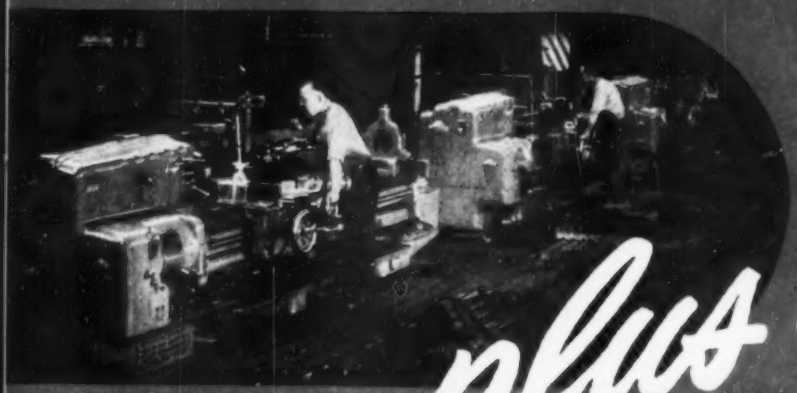
Yes . . . but fast! This 88" diameter cast-iron plate was ground on a No. 42-72-84 Blanchard in 3½ hrs., floor to floor. ¼" of stock—1520 cu. in.—380 lbs. was removed.

If you produce flat surfaces, your best bet is Blanchard Grinders—with Blanchard Wheels!

PUT IT ON THE BLANCHARD

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

THE BLANCHARD MACHINE CO.
64 STATE ST., CAMBRIDGE 39, MASS., U. S. A.



plus 3 minus 7

A Profitable Investment for *any* plant!

The world-renowned Otis Elevator Company recently installed three "AMERICAN" Duplicator Lathes which replaced seven engine lathes.

Such savings are the rule—not the exception—when "AMERICAN" Duplicators are put on the job.

These machines are performing "miracles" in savings in many of the largest and best known units of the metal working industry. They have introduced a new machining technique that has revolutionized the art of turning metal.

They reproduce work shapes from a template faithfully and accurately. They reproduce steps, tapers, right angle and tapered shoulders, recesses, grinding necks and radii, and are especially productive on such work as spindles, motor shafts, valve stems, back shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

More and more the necessity of reducing manufacturing costs is crystallizing in the minds of management. The attention of directors, top officials and especially production executives is being focused to an increasingly greater degree upon cost-cutting equipment. It is inevitable, therefore, that the "AMERICAN" Hydraulic Duplicating Lathe should command the spotlight. Evidence from a hundred installations proves beyond a shadow of a doubt their leadership as top flight cost reducers.

If it's proof you want just drop us a line—no obligation.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

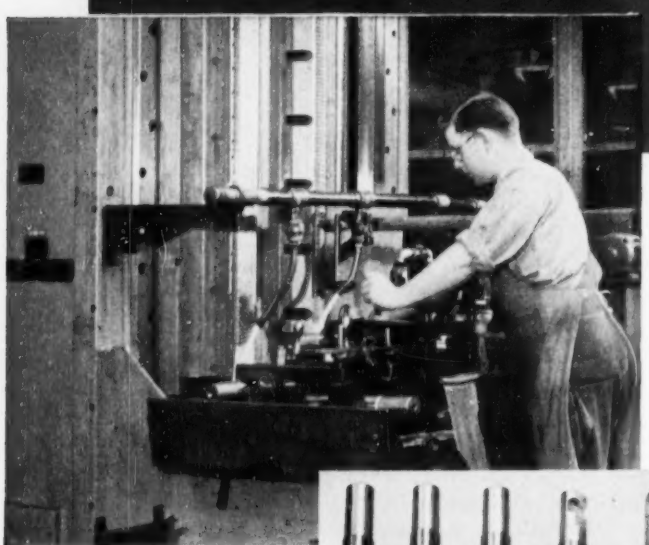
Unified Broaching

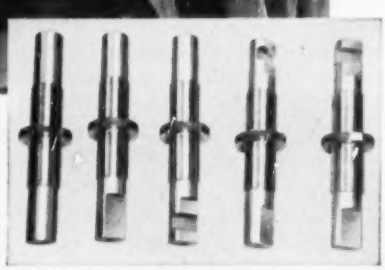
For Top Output

the COLONIAL method

At Colonial, experience, imagination and competence are applied

1. to the design and manufacture of each of the individual components of a complete broaching installation, and
2. to the effective combining of ALL components into a completely UNIFIED BROACHING installation—making them work as a "team."





252 Operations per hour on One Machine

252 broaching operations on the four stations of their 25-ton, 90-inch stroke Colonial Dual Ram give Caterpillar Tractor Co. a production of 63 track roller shafts of either of two types per hour. Shafts are heavy steel forgings 2½" x 18" with a 4½" flange.

Shafts are shown in broaching sequence, with the shaft to be broached at left.

Caterpillar reports "very little maintenance" on this UNIFIED BROACHING installation.

Machines, broaches, fixtures, etc., were all designed by Colonial as a UNIFIED BROACHING INSTALLATION.

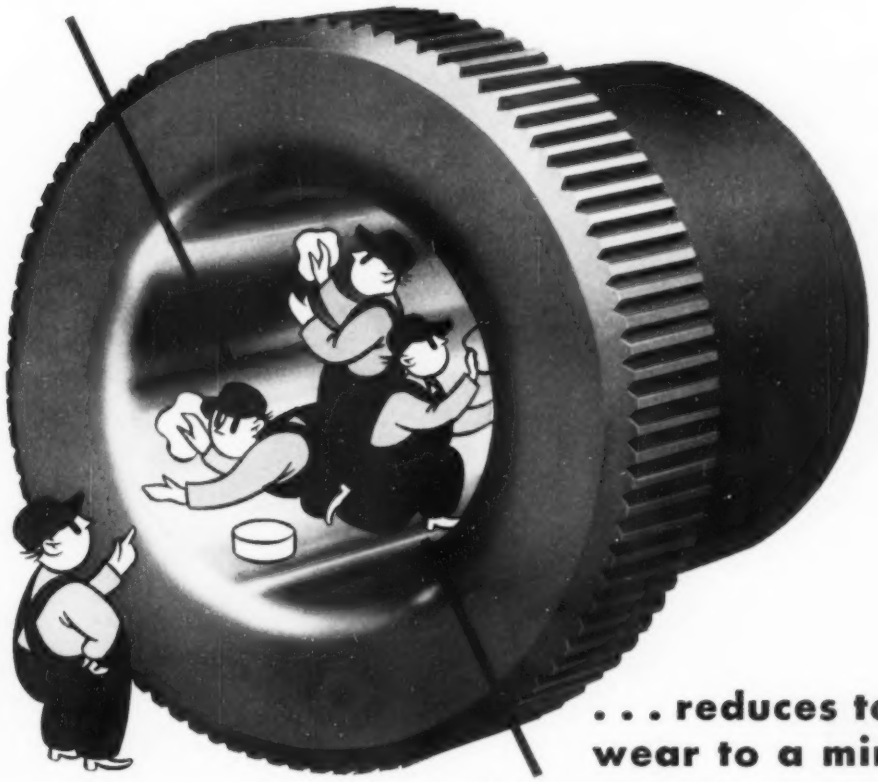
WHAT'S AHEAD IN BROACHING?

Keep up with the latest developments: Read "Broaching News". We will be glad to see you get it regularly if you will drop us a line on your company letterhead.

PIONEERS OF H.S.S. BROACHING

COLONIAL BROACH CO. DETROIT 13

SUPER FINISH OF UNIVERSAL DRILL BUSHINGS . . .



. . . reduces tool wear to a minimum

One sure way to cut excessive tool wear in your operations is to specify Universal Drill Bushings because their superfinish bores help reduce wear on production tools to an absolute minimum, especially in close tolerance work. The blended radius on the top inside diameter helps prevent tool hang-up and breakage. 100% concentricity and hardness tests insure accuracy, uniform high quality and long life. Knurled heads provide a quick, sure grip. Universal Drill Bushings are produced in a complete range of standard sizes and lengths. Orders for special dimensions will receive prompt attention. For complete information, write to the office nearest you—Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.—or our home office.

170

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 1 MICHIGAN

(1) BORING CHUCK
(2) MIKRO-LOK BORING BAR
(3) STANDARD COLLET CHUCK
(4) FLOATING COLLET CHUCK
(5) WEDGE-LOCK PRODUCTION VISE
(6) "KWIK-SWITCH" TOOL HOLDER
(7) STANDARD DRILL BUSHING
(8) UNIVERSAL INDEX PLUNGER

get a better job done

with

Mor-Speed

save time

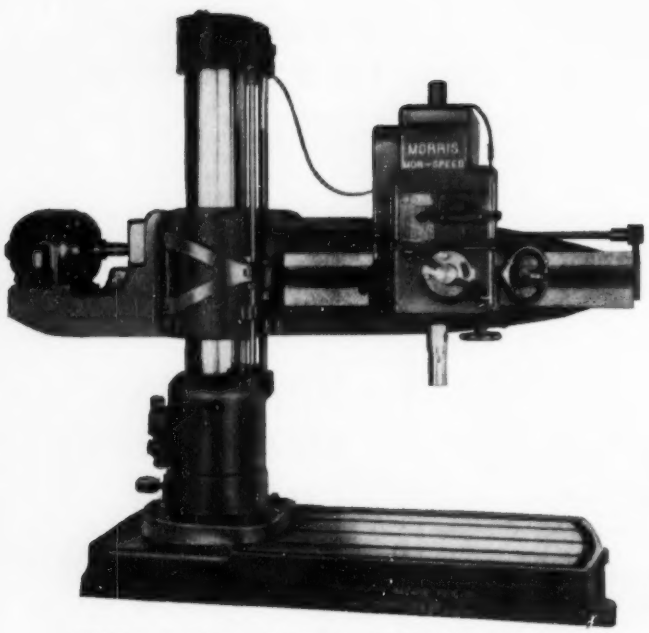
with completely centralized controls . . . instant selection of proper speed, feed; easily set automatic stops and trips.

with safety and dependability

tested safety devices safeguard machine, worker, workpiece . . . automatic lubrication protects built-in precision.

with lasting accuracy

alloy steels . . . modern hardening . . . extra anti-friction bearings, all assure minimum wear and low cost service.



9" Column Standard and Heavy Duty Models (with 3 and 4-foot arms)

11" Column Heavy Duty Model (with 3, 4, 5 and 6-foot arms)

Morris MOR-SPEED RADIALS

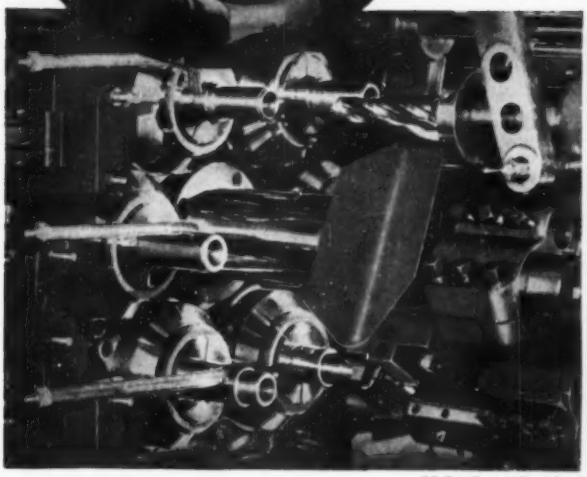
Whether for production or tooling MORRIS Mor-Speed RADIAL DRILLS give you fast, easy operation with accuracy so essential in holding down costs. Write for bulletin #59. Early deliveries available.

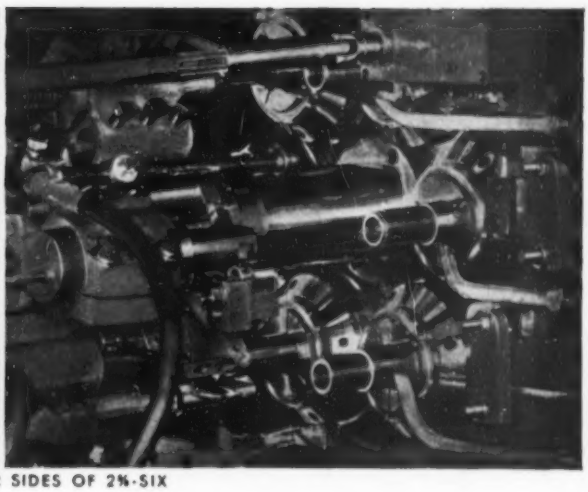
THE MORRIS MACHINE TOOL COMPANY
933 HARRIET ST. CINCINNATI 3, OHIO

Morris

"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

NO NEED TO "SETTLE" FOR LESS





FRONT AND REAR SIDES OF 2⅝-SIX

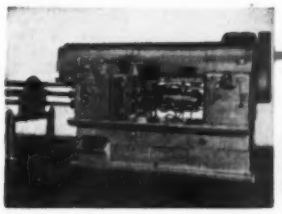
Multiple Spindle Bar Automatics produce more work per square foot of floor space than do other types of metal cutting machine tools. But, when *one* spindle is "down" *all* are "down." It's why dependability will always be the outstanding requirement of the "Automatic."

So many factors are involved in dependability that any weakness in design, engineering, material, or construction, will eventually contribute to higher costs of operation and maintenance.

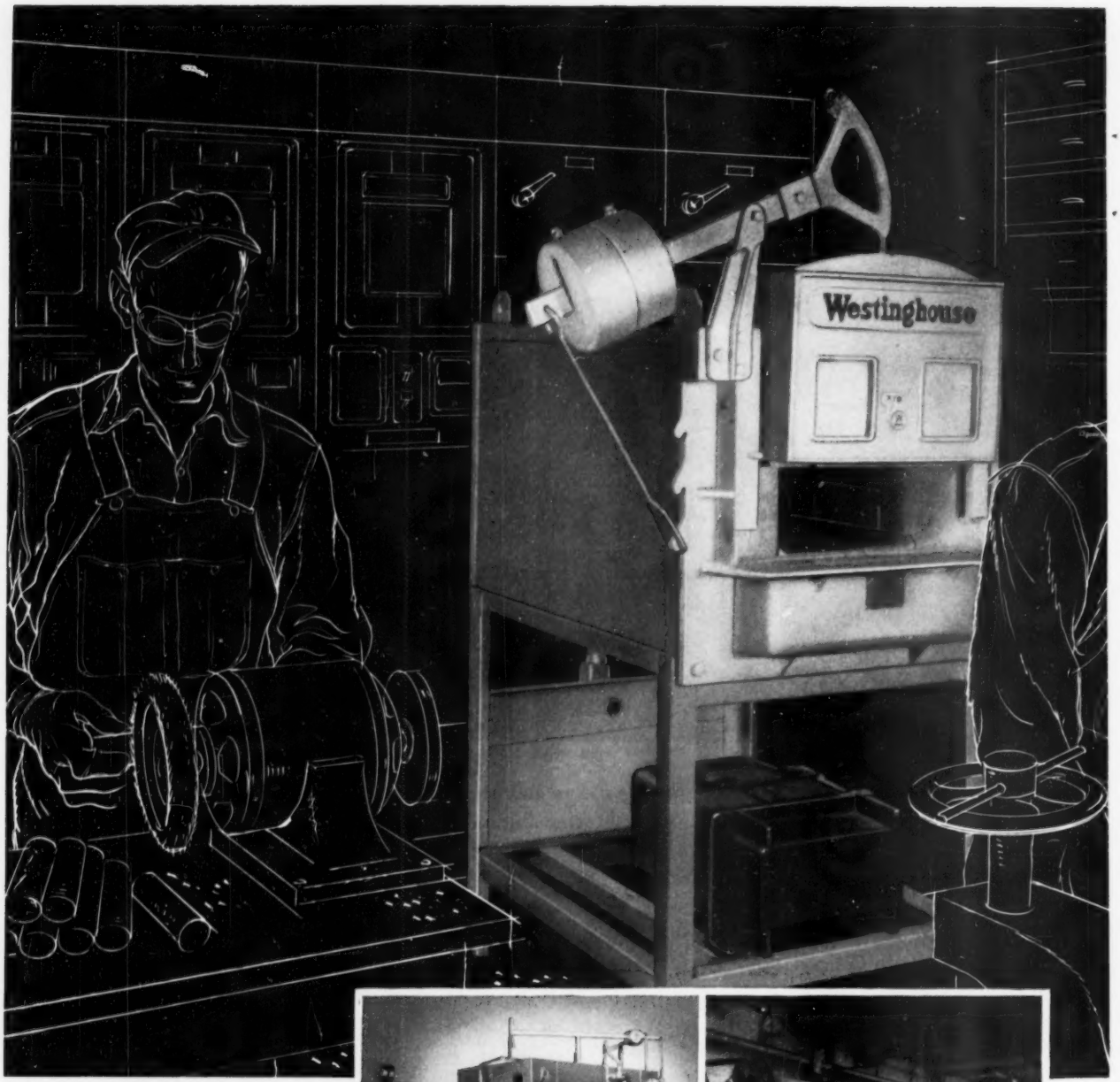
Part of any new machine's service to the prospective user is the availability of *full* information. No prospective purchaser need "settle" for less. At least it's that way with CONOMATICS.

In producing the piece shown, on a 2⅝-SIX, the eccentric forming attachment (see upper right illustration) combines the well known CONOMATIC facilities of form tool support and "all position" attachment spindle drive.

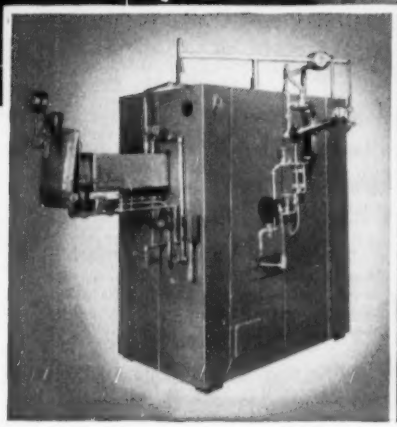
A Comparison of ALL Automatics is in favor of Coné



Conomatic} CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.



FOR YOUR TOOLROOM—Type H are designed for applications where batch heat-treating is possible and where a protective atmosphere is not required. They have a temperature range from 1200° to 1850° F. Safe loading capacity at 1600° F is 180 lbs./sq. ft. of hearth area.



FOR YOUR LABORATORY—High-temperature muffle furnace, for operation at 3000° F. This precision furnace was designed specifically for use in modern laboratory operations requiring extremely high controlled temperatures.

FOR YOUR PRODUCTION LINE—Type HG are primarily designed for hardening of carbon and alloy steels without scale or decarb when used with Endogas® atmospheres. Exogas® may be used to minimize scaling.

Westinghouse combines versatility and low cost in toolroom heat-treating

If your toolroom heat-treating calls for hardening, annealing, normalizing or pack carburizing, a Westinghouse Box-Type Furnace will fill your requirements. The Type H unit, for example, may be used without a protective atmosphere. Type H is built in five sizes to cover a broad scope of toolroom or production heat-treating requirements. And all sizes of these furnaces are designed for automatic temperature control.

Whether it be for your toolroom, laboratory, or production line, you'll get the heat-treating flexibility you need and want at low cost with Westinghouse Box-Type Furnaces.

For more information regarding Westinghouse Heat-Treating Furnaces, phone your nearest Westinghouse office, or write to Westinghouse Electric Corporation, Industrial Heating Department, Meadville, Pennsylvania. J-10393

YOU CAN BE SURE...IF IT'S

Westinghouse

Westinghouse Electric Corporation
Industrial Heating Department
Meadville, Pennsylvania

Please send me free 40-page booklet, *Harnessing Heat.*

Name_____

Firm_____

Title_____

Address_____

City_____ Zone_____ State_____

You're missing something if you don't remember CRUCIBLE HOLLOW TOOL STEEL

If you manufacture tool steel parts with cutout centers, and your aim is to reduce production time and costs, you can't afford to overlook Crucible Hollow Tool Steel. It comes in three famous grades: KETOS, AIRDI 150 and SANDERSON.

You don't have to drill and bore solid bars anymore. For these quality brands of tool steel are immediately available with machine-finished inside and outside diameters and faces — cut to your specific length requirements. And they come in a wide range of sizes.

By eliminating drilling and boring operations, Crucible Hollow Tool Steel will lower your production time per unit . . . increase your machine capacity . . . and reduce your scrap losses.

For full information and literature, call your nearest Crucible warehouse . . . or write for new brochure describing Crucible Hollow Tool Steel. Address Dept. A, Crucible Steel Company of America, Chrysler Building, New York, N. Y.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

HOLLOW TOOL STEEL

CRUCIBLE STEEL COMPANY OF AMERICA • TOOL STEEL SALES • SYRACUSE, N. Y.

Obsolescent, if!

These strong and able hands work a constantly shorter week at a steadily rising wage. Labor is producing less and less at a higher unit cost, IF . . .

. . . IF its productivity is measured in terms of output on yesterday's machine tools!

But *why* those old machines? Why—with management never more conscious of cost and the need to reduce cost—with never less likelihood for reducing cost in the areas of wages or taxes? Why—when greater productivity through new and improved machine tools offers the obvious, and only, way out?

Why again, with machine tools like today's Monarch lathes on the market? We can point, at random, to new Monarch installations that have effected a first year labor saving amounting to 49½% of lathe costs—or a tooling reduction of over $4,000.00—or a *two-lathe* output equal to that of four *less modern* machines.

You may think the answer is that your equipment is not yet fully depreciated and may not be for several years. There are taxes and higher replacement costs to consider, too.

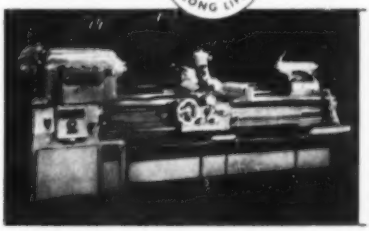
But we all have partial reserves and we all have earnings. And dollars don't maintain output. Machines do! Those dollars now available for machines that will balance off the labor factor with higher output are reserves for *productivity*. Invest them for that—now. . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

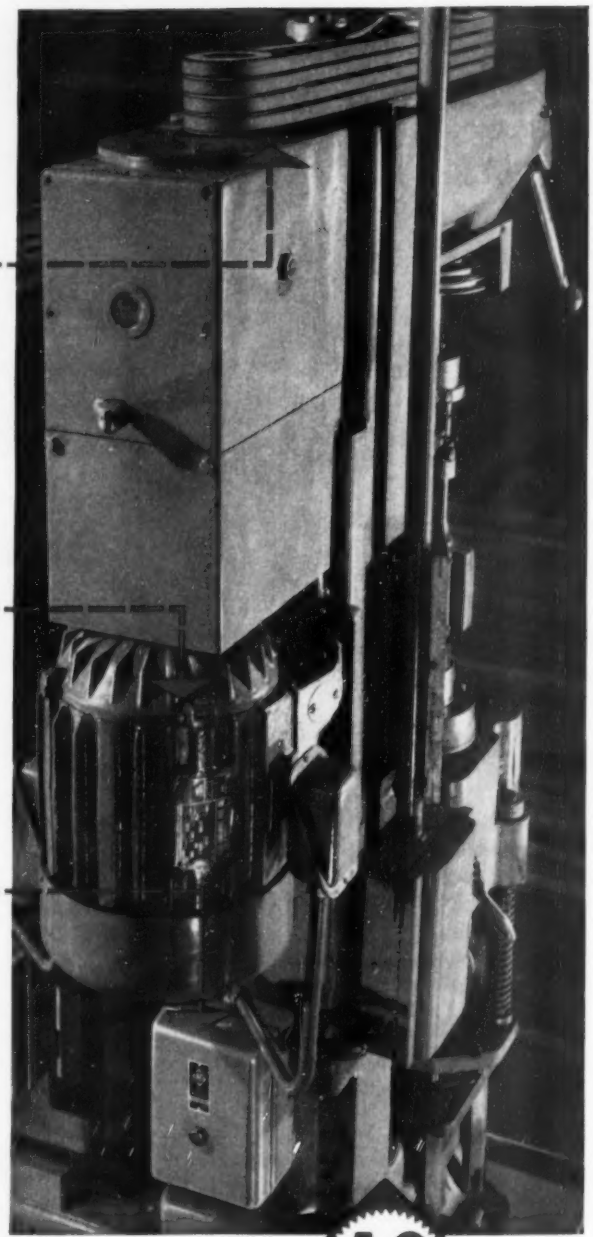


Monarch Series 60 with Air-Gage Tracer—for quick, automatic duplication of contours. Monarch has built fine lathes for production line and toolroom since 1909—has pioneered the use of tracer controls since 1930.

Designed to Work Together

Texrope Drives

Texrope V-belt drives, the original multiple V-belt drive, are available in a complete range of types and sizes, both fixed and variable speed. More and more machine designers are finding the moderate cost of *Vari-Pitch* sheaves is returned many times in increased machine versatility and more precise quality control. With either Stationary Control or Motion Control *Vari-Pitch* sheaves, speeds can be accurately adjusted quickly and easily over a wide range.



Motors

The increasingly high cost of maintenance labor has made the use of totally-enclosed, fan-cooled motors on machine tools more popular — and more profitable — than ever. This Allis-Chalmers TEFC motor is especially well suited to this application because it has no enclosed cooling air passages. Since all cooling surfaces are exposed, the motor is easy to clean with cloth, air or vacuum cleaner. Even with the oily atmosphere of many machine shops, dirt wipes off easily.

Motor Control

Allis-Chalmers motor control is available for most designers' applications from size 0 up. Allis-Chalmers builds many types of squirrel cage and wound rotor motor control, dc motor control and variable speed control for many applications. Shown here is a full voltage across-the-line starter with reset button.

Nation Wide Service

Nearly 100 Allis-Chalmers Certified Service Shops throughout the country provide factory-approved parts and service on Allis-Chalmers drive equipment. Complete information on special equipment also is provided.

Get the help of your Allis-Chalmers District Office representative on your drive plans. Call him or write for Bulletins 51B6052, 20B6051, and 14B7733. Allis-Chalmers, Milwaukee 1, Wisconsin.

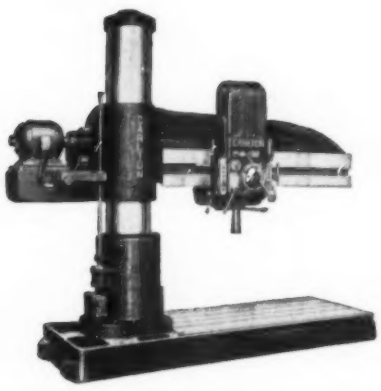
A-4005

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

Only ONE can be called the Finest: Carlton

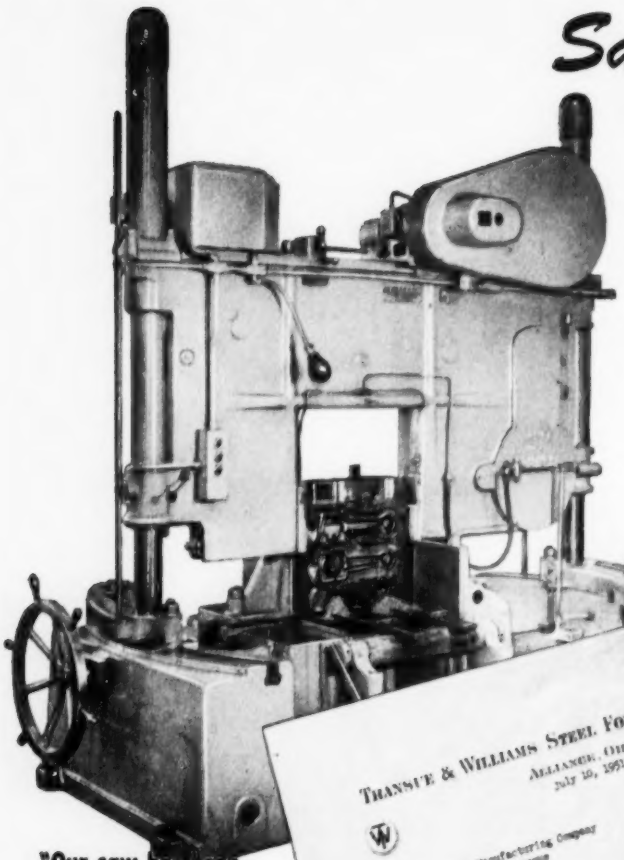
. . . here's another good reason why: low maintenance cost

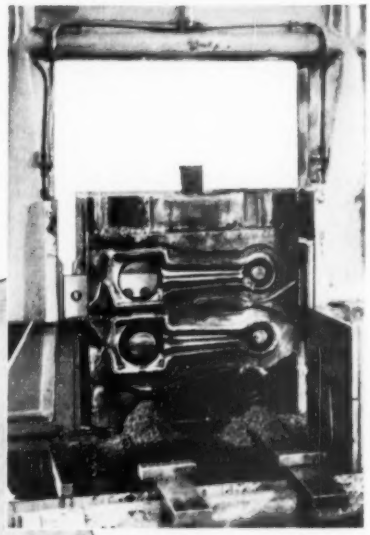


CARLTON RADIAL DRILLS cost less to maintain because they are *designed for less maintenance attention.* For example: there's only *one* friction clutch to adjust. There are *no* tapered gibs to adjust because the head travels across the arm on hardened steel ways. Automatic lubrication throughout eliminates the damage and unnecessary wear that occurs in ordinary radial drills.

COMPARE CARLTON AND YOU'LL BUY CARLTON. Judge for yourself why Carlton radial drills are the first choice of American industry. Write for bulletins. The Carlton Machine Tool Co., Cincinnati 25, Ohio.

Save 25% Time in Re-facing Dies... 20% Time -plus steel- in Shanking Them





Trimming the worn impression from the face of a 20" x 24" die block with a No. 24 MARVEL Universal Hydraulic Roll Stroke Hack Sawing Machine. Average Blade Cost $.0108 per square inch.

"Our saw has been in operation 2 years. Most of our sawing has been on die blocks..."

"We are removing the worn impression from the face of die blocks for resinking ... we recently removed 2 inches from face of blocks measuring 19" x 17" ... sawing time 296 minutes for 2 blocks ... Set up time 31 minutes ... grinding time 155 minutes ... total 8 hours and 2 minutes.

"Average time for removing same amount of stock from these die blocks with planer, 10 hours and 15 minutes. Sawing saves approximately 25% of time ...

"With regard to removing excess stock to provide shanks ... we remove approximately 90% of metal by sawing after which block is sent to planer for finishing. Time for sawing and planing is 20% less than planing alone.

"Pieces of stock removed by sawing are useful in many ways ... saves buying of some trimmer steel."

TRANSUE & WILLIAMS STEEL FORGING CORPORATION
ALLIANCE, OHIO
July 10, 1951

Armstrong Blum Manufacturing Company
5700 W. Bloomingdale Avenue
Chicago 39, Illinois

Attention: Mr. Van Austin,
Sales Manager

Gentlemen:

It is felt that you would be interested in having some of the data we have compiled on our 24 x 24 Marvel Metal Cutting Saw. As you know, our saw has now been in operation approximately two years. Most of our sawing has been on die blocks furnished us either by the Hyppenstall Company of A. Finkl & Sons Company.

We wish to advise you that we are removing the worn impression from the face of die blocks for resinking with the use of this saw and find that it works to a very definite advantage, depending somewhat on the amount of stock to be removed from the face of the die. On a job which we recently removed two inches from the face of blocks measuring 19 x 17", our sawing time was 296 minutes for the two blocks, set-up time was 155 minutes, and the time required for grinding the face after sawing was 31 minutes, total 482 minutes or 8 hours and 2 minutes. To remove the same amount of stock from these blocks with our planer, over an average of eight sets of dies required 10 hours and 15 minutes for planing and grinding, or approximately 25% additional time. We might point out that our labor rate for a saw operator is less than that being paid to a planer operator, which further increases the saving somewhat. From our experience, we find there only one inch is to be removed from the face of the die, the saving is somewhat less, but in our case has been very definitely in favor of the saw.

With regard to removing the excess stock to provide shanks on our dies, this naturally varies with the size of blocks and the depth of the shank involved. However, our average over a year and a half period has indicated to us a saving of 20% in other words, we remove approximately 90% of the metal by sawing after which the blocks are sent to the planer for finishing the shanks. The total elapsed time for the sawing and planer for have found to be 20% less than that required by planing alone. We should also like to point out that the pieces of stock removed by the sawing operation to us in many ways and have eliminated the necessity of buying some of our trimmer steel.

Perhaps you also would be interested in our blade life and blade cost. We have found that with an original blade and having it reground once we are able to cut 1,250 square inches. The cost of the blade being as

...th of this would be.

...ere,

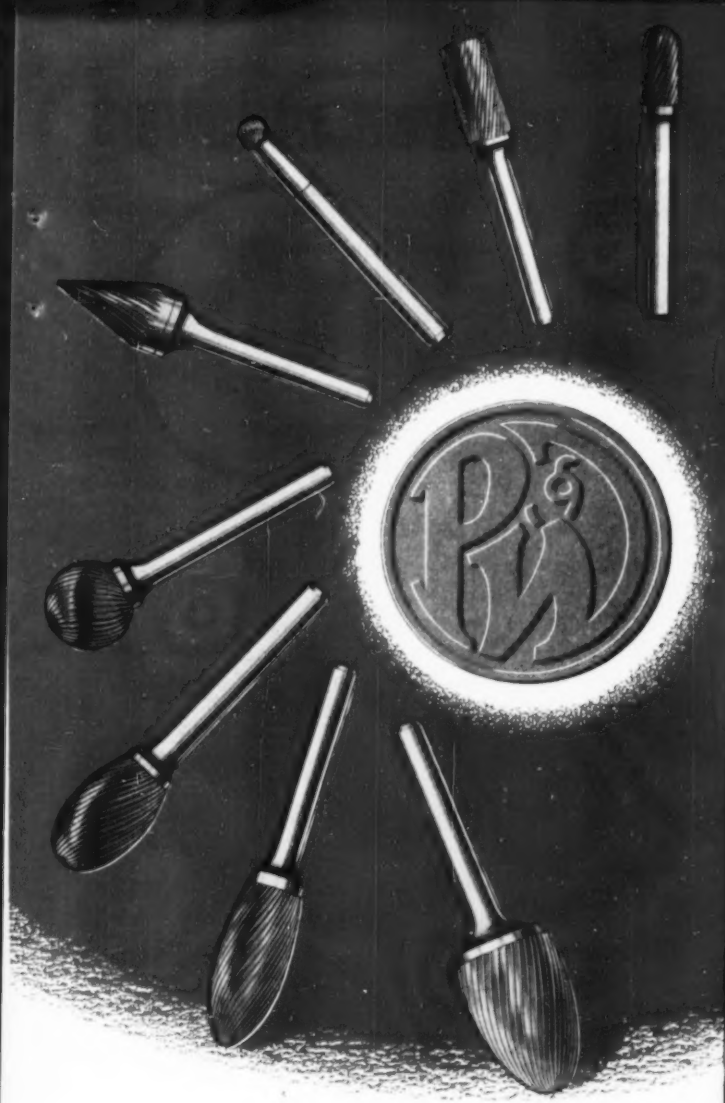
...STEEL FORGING CORPORATION

...Factory Manager

Write for Catalog of MARVEL Modern Metal Saws

Metal Cutting
MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. 5700 W. BLOOMINGDALE AVE. CHICAGO. (39) U. S. A.



MORE DIFFERENT JOBS DONE BETTER and FASTER with KELLERFLEX BURS

Precision in every respect, Pratt & Whitney Kellerflex Burs give more efficiency . . . cut faster, smoother, longer than any other cutting tool of this type. Here are some reasons why:

CORRECT DESIGN — Rake angle, flute helix, spacing are right for your jobs because P&W leads in scientific Bur Engineering.

FINE MATERIALS — Correct grade of carbide and expertly heat-treated high speed steel, mean keen cutting edges and longer cutting life.

MASTER-GRINDING by MACHINE — From hardened solid blanks *was originated by Pratt & Whitney* to assure complete concentricity, uniform flute spacing and form, and superior balance so essential to smooth cutting without chatter or bounce. No hand-ground bur can match this performance. At P&W, "machine-grinding" means "100% by machine" — human error is eliminated.

EXACT DUPLICATES — All P&W Burs of the same size and shape (there are 14 standard shapes plus dozens of specials) are exactly alike. You can order replacements by number and always get identical performance.

USED ON KELLERFLEX FLEXIBLE SHAFT MACHINES . . .

. . . like the Series M shown above, you have smoothness, ample power and speed range to obtain maximum performance from Kellerflex Burs. Smaller and larger models are also available. Write on your Company letterhead to the Pratt & Whitney Branch Office nearest you — or direct to West Hartford. Ask for Circular No. 521-2 on the "Series M" Machine.

GET COMPLETE, MONEY-SAVING INFORMATION NOW. Write on your Company letterhead to the Pratt & Whitney Branch Office nearest you — or direct to West Hartford. Ask for the new P&W Kellerflex Bur Catalog.

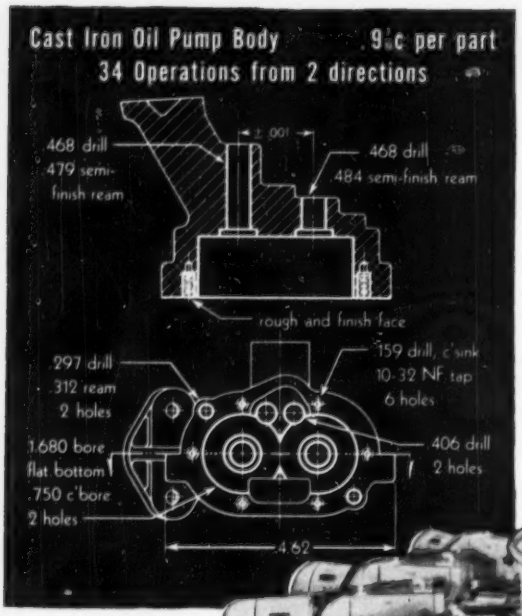
PRATT & WHITNEY
DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONNECTICUT, U. S. A.

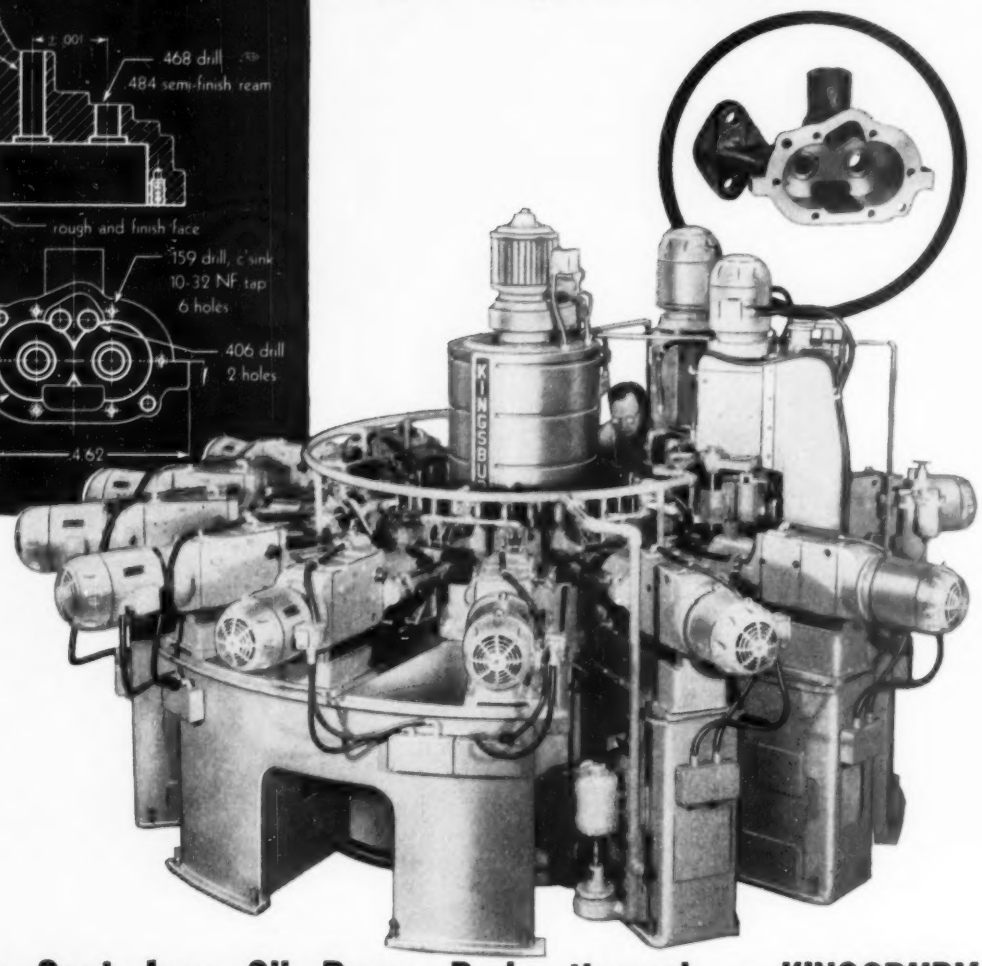
First Choice for Accuracy

Branch Offices . . . BIRMINGHAM • BOSTON • CHICAGO • CINCINNATI • CLEVELAND • DALLAS (The Sharon Co.) • DETROIT • HOUSTON (The Sharon Co.) LOS ANGELES • NEW YORK • PHILADELPHIA • PITTSBURGH • ROCHESTER • SAN FRANCISCO • ST. LOUIS • EXPORT DEPT., WEST HARTFORD

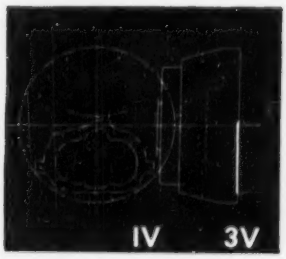
MACHINE TOOLS • CUTTING TOOLS • GAGES

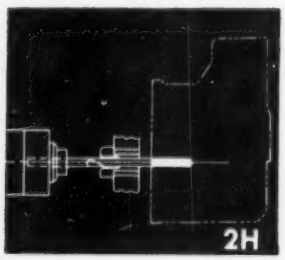
Higher production, lower

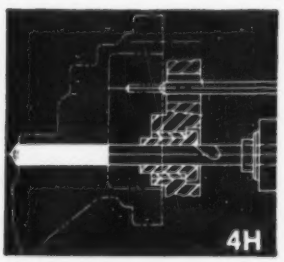


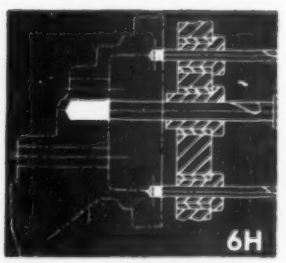


Follow this Cast Iron Oil Pump Body through a KINGSBURY









This Kingsbury accomplishes 34 operations from two directions. It mills, drills, bores, c'sinks, reams and taps. Used by a leading automotive manufacturer for a cast iron oil pump body, it produces 200 parts per hour gross; has a central column with an 84-inch base and a 60-inch index table with 14 stations. Of the 13 units, two are vertical (V) and 11 are horizontal (H). Eight of these units have multiple spindles.

Thirty-four operations are accomplished by one man on this one machine. Follow through and see:

Unit 1-V (Station 1 vertical) rough mills the base of the large flange. This milling operation employs our heaviest milling unit: about as large as we care to handle.

Unit 2-H with six-spindle head drills six .159 holes .74 deep.

Unit 3-V finish mills the face.

Unit 4-H countersinks three of the .159 holes and drills a .453 hole.

Unit 5-H countersinks the remaining three .159 holes and drills a .438 hole.

Unit 6-H drills a .406 hole and two .297 holes.

At *Unit 7-H* another .406 hole is drilled and the .297 holes are .312 reamed.

costs, soon pay for a Kingsbury

Combined operations on a Kingsbury bring you distinct advantages.

You benefit from the combined operations of a Kingsbury special purpose production machine. Output per man hour is increased. The part is not moved after once being chucked. It travels through a work cycle where units of from ½ to 5 hp each drill, ream, c'bore, mill, tap, thread, etc., accurately and automatically.

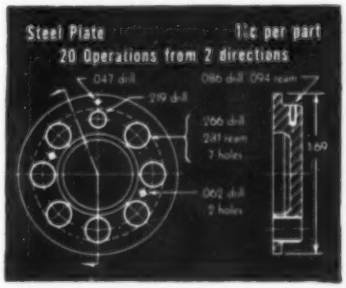
These combined operations cut production costs. Only one operator is required. He loads and unloads the machine. Handling of each part is reduced to this one chucking operation. There is almost no scrap loss — each part is machined uniformly to specifications. Less floor space is required than for separate machines.

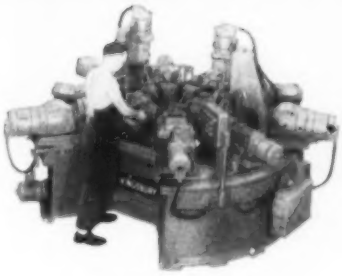
If you are interested in further information on these special purpose machines, we'd be pleased to hear from you.

Kingsbury Machine Tool Corp.,
101 Laurel St., Keene, N. H.

KINGSBURY

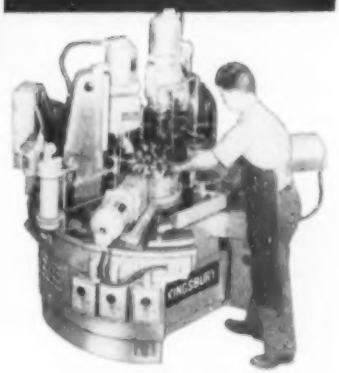
AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production





Steel Plate
540 parts per hour gross
1 6/10¢ per part

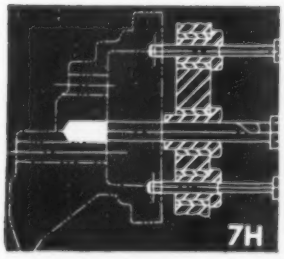
This part measures only 1.69 OD, and contains 12 holes. Most of these are partial holes. The machine has two Vertical Units and nine Horizontal Units operating 20 spindles in all. Close center distances prevent the use of more than two spindles at any one unit. Rigid tolerances must be held.

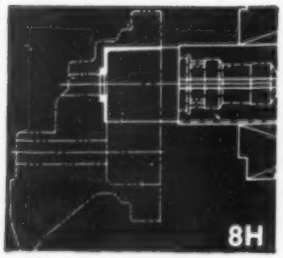


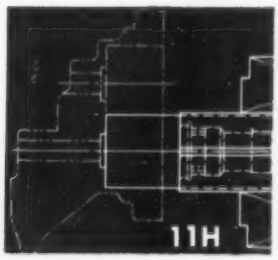
Brass Padlock Body
460 parts per hour gross
1 1/10¢ per part

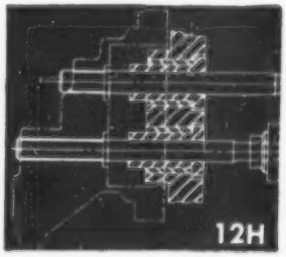
This is a comparatively simple machine with six operations, four horizontal, two vertical. It drills, c'bores, reams and taps — all automatically. The machine is compact with 60" diameter base, 12" diameter index table, six fixtures and six drilling units. Bushings guide drills and reamers.

as it produces 200 parts per hour gross at 9 7/10c each









Units 8-H, 9-H, 10-H, 11-H

Here we work on the thru-holes and large bores with combination tools; really the most interesting operations. Drawings 8-H and 11-H illustrate these operations. A 1.680 hole is rough bored at both Unit 8-H and 9-H, each with a flat bottom and .750 c'bore. These two 1.680 holes then receive a semi-finished bore with flat bottom at Units 10-H and 11-H.

Unit 12-H. The .484 holes bored at 4-H and 5-H receive a semi-finished ream.

Unit 13-H with six 10-32 NF taps performs the tapping operation in the six holes drilled by Unit 2-H.

Operator stands at the 14th station when he loads and unloads the machine. An air cylinder clamps and unclamps the work fixtures.

Each Unit Cost on the drawings includes the cost of the man and of the machine — no power or overhead. We assumed:

Unit cost of man equal to:

$$\frac{\text{average U. S. hourly wage}}{\text{hourly gross x 80\% efficiency}}$$

Unit cost of machine to be:

$$\frac{\text{price of tooled machine}}{\text{output in 6000 hrs. @ 80\% efficiency}}$$

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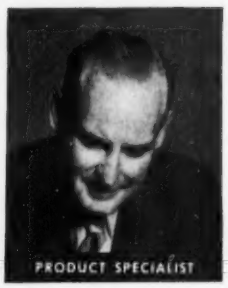
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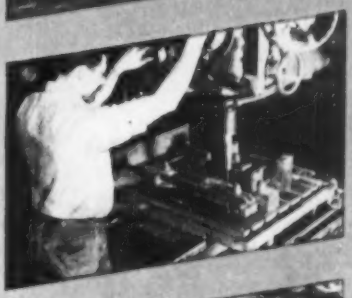
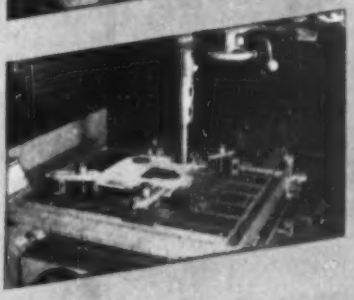
BULLARD SPACER





Norton Company, Grinding Machine Division

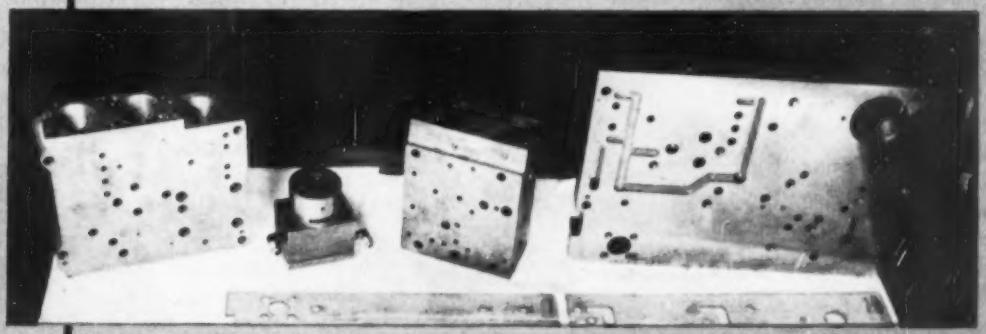
is obtaining important advantages from use of 4 BULLARD SPACERS on intricate drilling, reaming and tapping jobs.

Among the benefits received is a marked reduction in Operator fatigue. This is especially pronounced in overtime operation.

NORTON COMPANY has also found that with incentive time allowances, jig work Operators' efficiency is regularly held at 90% to 125%, while that of their Operators on BULLARD SPACERS runs 115% to 150%.

We can offer FAVORABLE DELIVERIES on BULLARD SPACERS

Ask for your copy of "The Norton Story"



THE BULLARD COMPANY

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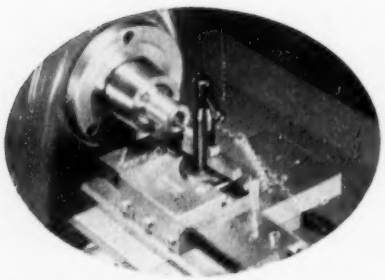
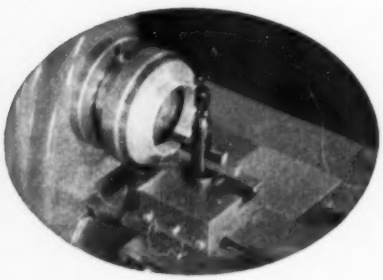
ELMIRA, N.Y.

HIGH SPEED PRECISION LATHE

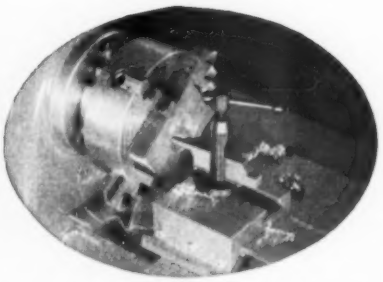
Correct Size - High Speed - Precision Results



Collet Work — The right machine for collet work of one-inch or less diameter.



Step Chuck Work — For rapid and accurate holding of tubing, castings, moldings, stampings and machined parts. Capacity to 6".



Jaw Chuck Work—Integral mount, universal or independent, for extra accuracy. Capacity to 5".

SPECIFICATIONS:
1" Collet Capacity
9" Swing
17" Center Distance
8 Speeds to 4000 rpm.

The above three important requirements for proper lathe work in tool rooms, production departments, or laboratories are completely fulfilled by the new Hardinge DV59 High Speed Precision Lathe.

Correct size of the machine in relation to work saves loss from under-capacity production on larger lathes. High spindle speeds, up to 4000 r.p.m., permit full capacity cutting and excellent finish. Sustained accuracy and ease of operation assure precision results.

Send for Free illustrated Bulletin DV 59

HARDINGE BROTHERS, INC., ELMIRA, N. Y.
PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE

A FAMOUS Name in Pumps Specifies a FAMOUS Name in Materials...

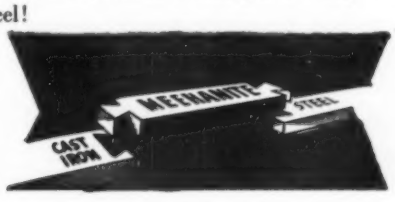
NO one familiar with industrial products will deny that Vickers, Inc., Detroit, Mich. is truly a famous name in pumps and all types of hydraulic equipment.

Among the many important types of pumps produced by Vickers is the combination Vane-Type Pump (Fig. 1). In this high pressure unit designed for compactness for successful operation in limited space it is obvious that the housing or body (Fig. 2) would have to be produced in a metal which would provide regularly and dependably pressure tightness, high tensile strength, uniformity, freedom from defects and good machinability. It is for these reasons that Vickers regularly specify Meehanite castings.

The name Meehanite Metal has also earned itself fame among design engineers, production executives, management and purchasing officers who concern themselves with the selection, specification and procurement of component parts and materials requiring the maximum, both property and quality-wise.

Whether your castings require density and pressure tightness; or high tensile strength; or heat treatability for toughness and wear resistance; investigate the wide range of materials available in Meehanite castings.

Remember that Meehanite "Bridges the Gap" between cast iron and steel!



Take *YOUR* Casting Problem To A MEEHANITE FOUNDRY

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The American Laundry Machinery Co.	Rochester, New York
Atlas Foundry Co.	Detroit, Michigan
Banner Iron Works	St. Louis, Missouri
Barnett Foundry & Machine Co.	Irvington and Dover, New Jersey
E. W. Bliss Co.	Hastings, Mich. and Toledo, O.
Builders Iron Foundry	Providence, Rhode Island
Compton Foundry	Compton, Calif.
Continental Gin Co.	Birmingham, Alabama
Crawford & Doherty Foundry Co.	Portland, Oregon
The Cooper-Bessemer Corp.	Mt. Vernon, Ohio and Grove City, Pa.
De Laval Steam Turbine Co.	Trenton, New Jersey
M. H. Detrick Co.	Peoria, Ill. and Newark, N. J.
Empire Pattern & Foundry Co.	Tulsa, Oklahoma
Farrel-Birmingham Co., Inc.	Ansonia, Connecticut
Florence Pipe Foundry & Machine Co.	Florence, New Jersey
Fulton Foundry & Machine Co., Inc.	Cleveland, Ohio
General Foundry & Manufacturing Co.	Flint, Michigan
Greenlee Foundry Co.	Chicago, Illinois
The Hamilton Foundry & Machine Co.	Hamilton, Ohio
Hardinge Company, Inc.	New York, New York
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Johnstone Foundries, Inc.	Grove City, Pennsylvania
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Koehring Co.	Milwaukee, Wisconsin
Lincoln Foundry Corp.	Los Angeles, California
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Otis Elevator Co., Ltd.	Hamilton, Ontario
The Henry Perkins Co.	Bridgewater, Massachusetts
Palmyra Foundry Co., Inc.	Palmyra, New Jersey
Pohlman Foundry Co., Inc.	Buffalo, New York
Rosedale Foundry & Machine Co.	Pittsburgh, Pennsylvania
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Sonith Industries, Inc.	Indianapolis, Ind.
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Warren Foundry & Pipe Corporation	Phillipsburg, New Jersey

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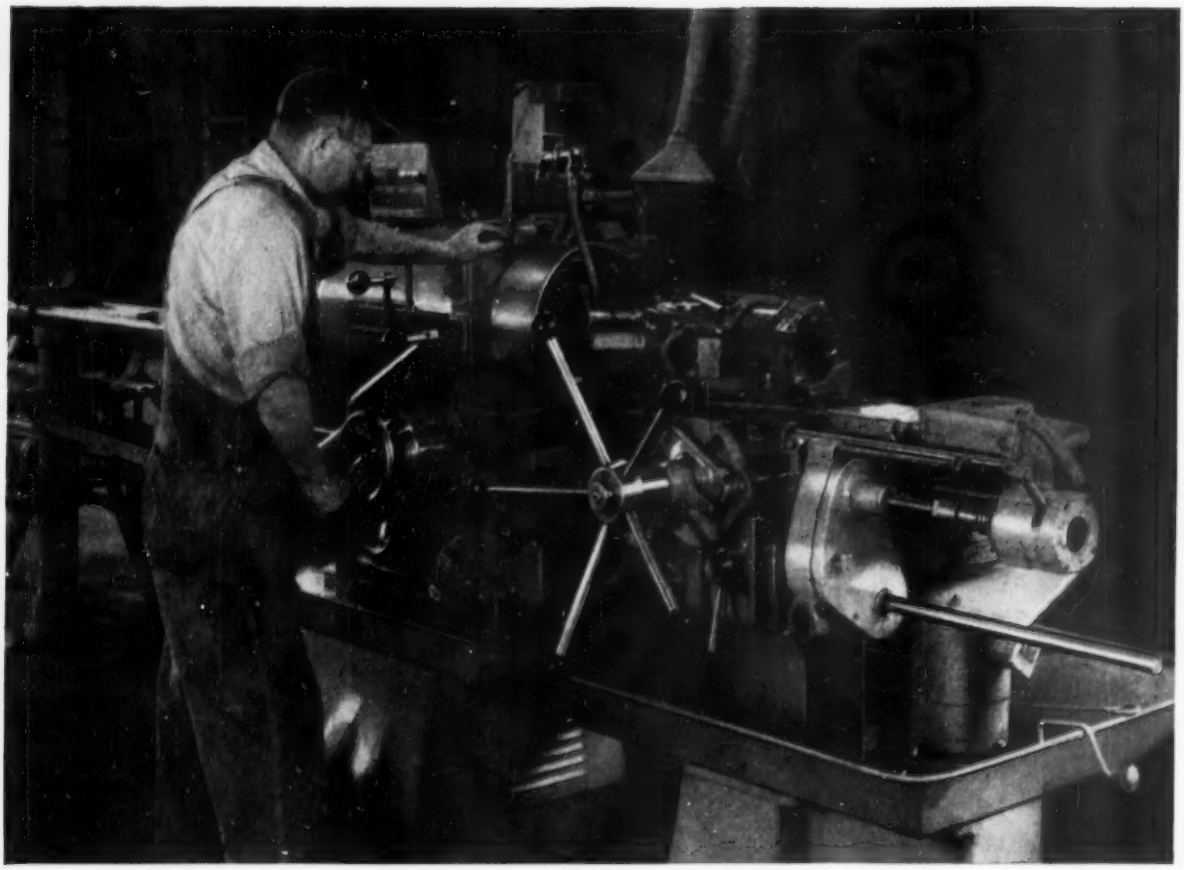

MACHINING FOR GOLD at Homestake

with Gisholt Turret Lathes

Yes, gold mining means machinery. And here at the famous Homestake Mine at Lead, South Dakota, Gisholt Turret Lathes help to machine the machines that dig for gold. It's a big job, too—turning out the variety of rock bits and drill rods that are used up in large numbers.

This Gisholt Ram Type Lathe was first used to turn the plain ends on the one-inch quarter-octagon drill steel for two types of rock bits. Production averaged 30 an hour. Now, the machine is also used to machine and thread three sizes of forged steel drill rods. Besides all this, the Gisholt has the job of facing and chamfering the chuck, or shank ends, of the drill steel so that a perfectly flat face is hit by the drill machine tappet.

Here, again, Gisholt Ram Type Turret Lathes prove their easy change-over and ability to produce profitably, even on small runs—big assets in any machine shop. Ask your nearest Gisholt representative about them. Or write us.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

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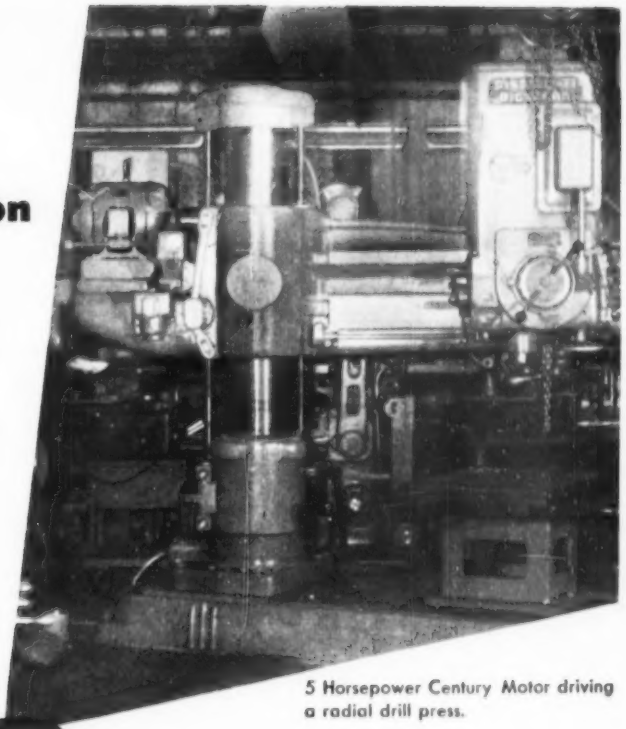
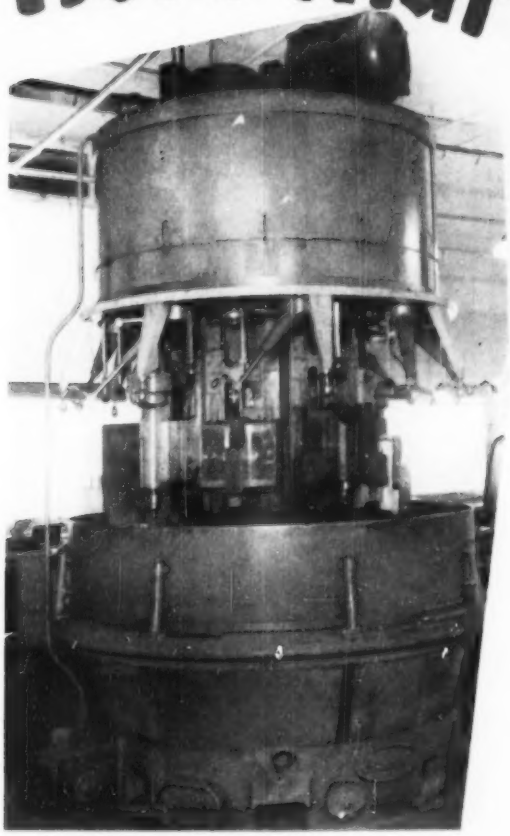


5 Horsepower Century Motor driving a radial drill press.

Hold That Precision Line



25 Horsepower Century Motor on a Bullard Automatic.

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Century motors supplement the precision of fine equipment . . . resulting in closer tolerance of the product produced by the equipment.

The unusual freedom from vibration in Century motors is contributed by: Accurate concentric machining to provide a uniform magnetic airgap between the rotor and stator . . . Balanced electrical design . . . careful dynamic rotor balancing . . . accurately machined mounting surfaces.

Century offers a most complete line of types and sizes from ⅛ to 400 horsepower.

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HOW DO YOUR CUTTING OIL COSTS COMPARE WITH ANTISEP ALL PURPOSE BASE?

Chances are you're paying much more than 8¢ per gallon in the machine . . . the average cost of Antisep All-Purpose Base. And Antisep All-Purpose Base also gives you these extras:

. . . . *VERSATILITY*
one cutting fluid to do 90% of all jobs

. . . . *LUBRICITY*
to withstand pressure and reduce friction

. . . . *ANTISEPTIC PROPERTIES*
no skin sores, no rancid odors

. . . . *FILM STRENGTH*
which gives you longer tool life

. . . . *COOLER WORK*
which can be handled bare-handed

THIS ANTISEP USER CUTS 80% OFF COOLANT BILL AND INCREASES TOOL LIFE 83%!

Broaching internal 1¼" I.D. spline on prop shaft tube coupling of SAE 4135 steel, this customer saved $699.60 on oil costs since changing to Antisep A.P. Base. One part Antisep to 20 parts plain water was used. Straight cutting oil formerly used cost 54c per gallon. User reports cleaner operation, too, with less handling of oil. In addition he reports, "We now get 1100 pieces per broach grind with Antisep, instead of the 600 our straight cutting fluid gave us!"

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DOWN

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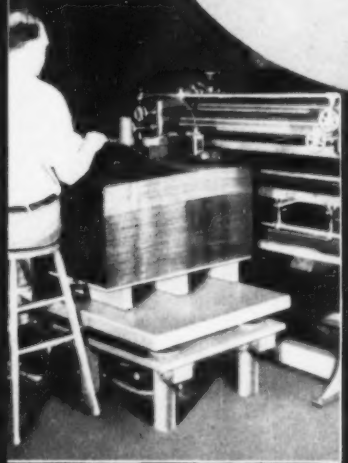

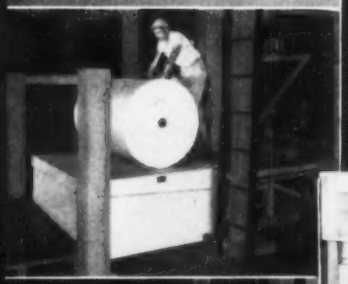

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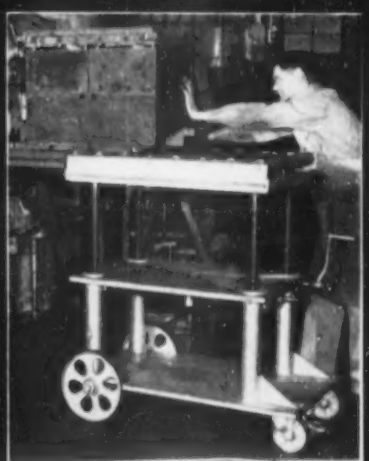

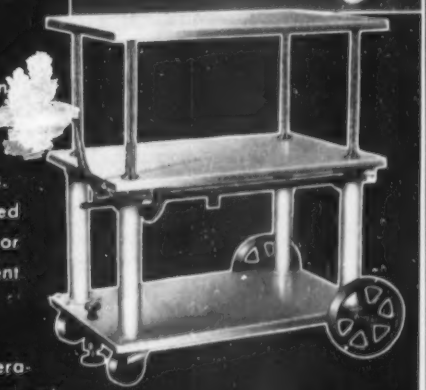

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1. **The problem of lowering costs**
2. **The problem of increasing output**

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By providing stronger, more efficient tools, carefully developed for each operation, as well as ARMSTRONG High Speed Steel, ARMALOY Cast Alloy Cutter Bits or Armide Carbide-Tipped Cutters as required for each job, ARMSTRONG TOOL HOLDERS permit greatly increased speeds and feeds, enable you to increase the hourly output of every lathe, planer, slotter, shaper, turret lathe and screw machine.

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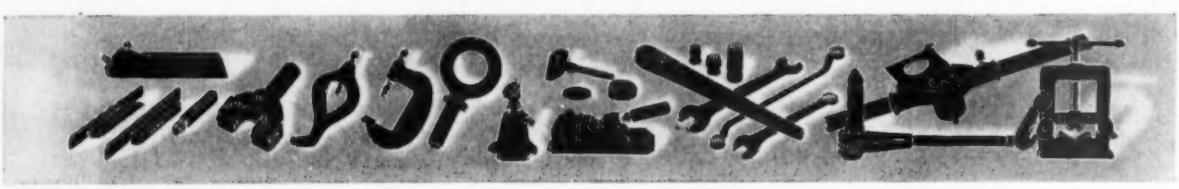

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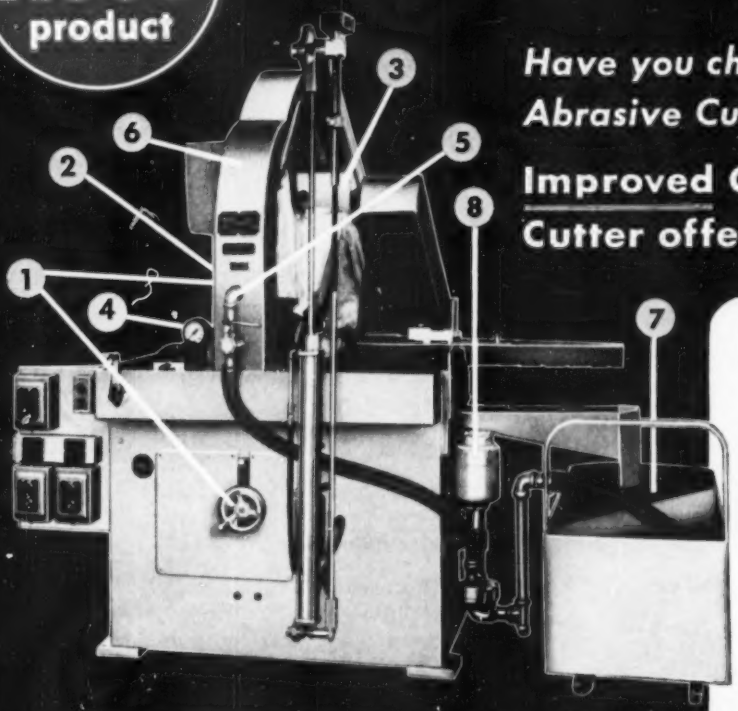

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2. **WHEEL GUIDES** for more accurate cuts . . . reduces wheel flutter
3. **CUTTING WHEEL OSCILLATION** for quality cutting over 2" diameter solids
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—plus many other valuable features!

CAMPBELLS *Save You Money*

• Even old model abrasive cutters made big savings by reducing the cut-off time per piece, but the new improved CAMPBELL Abrasive Cutters—with their many new time and effort reducing features—show still greater efficiency and savings. CAMPBELLS pay for themselves out of savings.

Check the methods and equipment you use. On many jobs cutting time can be reduced up to 75%. Machines can be furnished in fully automatic or semi-automatic types.

Write today for Bulletin **DH-260** which tells you how to modernize your cutting procedure with a CAMPBELL 406. Then give us details of the job to be done so we can make recommendations and quote prices.

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AND IT'S STILL GOING STRONG!

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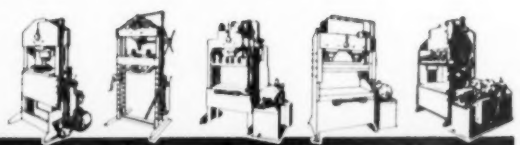
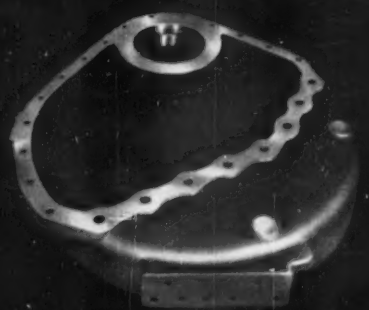


Designers and Builders of the Right Hydraulic Press to Solve Your Metal-working Problems!

NATCO HOLETAPPER and DRILLER

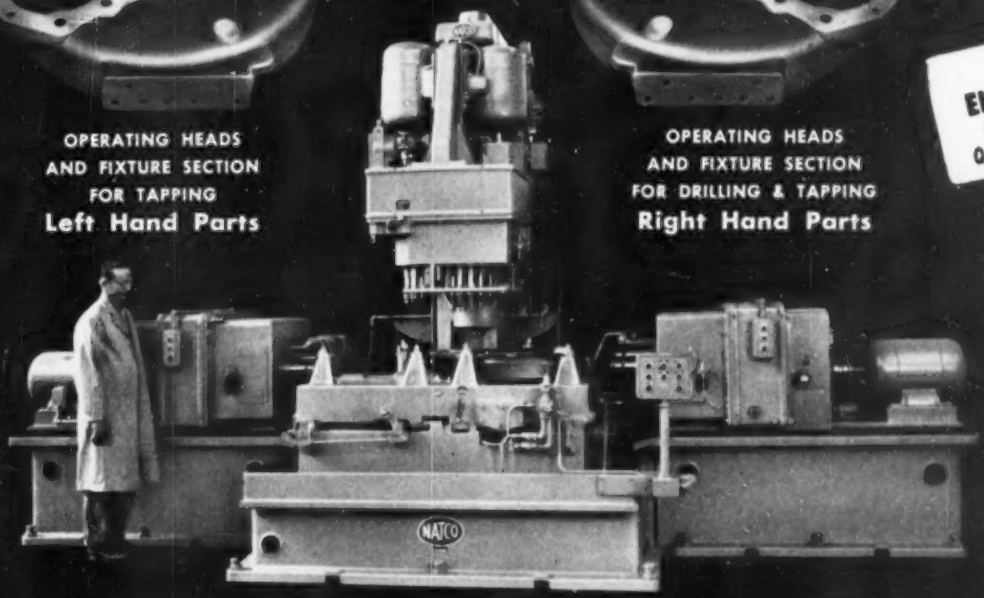
DRILLS AND TAPS EITHER RIGHT HAND OR LEFT HAND TANK CASES



OPERATING HEADS AND FIXTURE SECTION FOR TAPPING **Left Hand Parts**

OPERATING HEADS AND FIXTURE SECTION FOR DRILLING & TAPPING **Right Hand Parts**

NATCO ENGINEERED for Quality and Quantity Production



OPERATION DETAILS

LEFT HAND PART

POSITION 1
Remove and Load

POSITION 3
Vertical Head
Tap 4 Holes
L. H. Horizontal Head
Tap 4 Holes

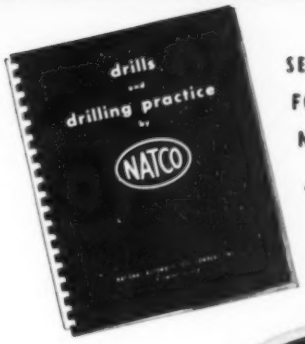
POSITION 2
Vertical Head
Idle
L. H. Horizontal Head
Tap 3 Holes

RIGHT HAND PART

POSITION 1
Remove and Load

POSITION 3
Vertical Head
Drill 8 Holes
R. H. Horizontal Head
Tap 4 Holes

POSITION 2
Vertical Head
Tap 8 Holes
R. H. Horizontal Head
Tap 3 Holes



SEND ONE DOLLAR FOR THIS USEFUL NEW HANDBOOK

Address: NATCO, Richmond, Indiana

Call a Natco Field Engineer

to help you solve your problems in Drilling, Boring, Facing and Tapping

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

1809 Engineering Bldg., CHICAGO • 409 New Center Bldg., DETROIT
1807 Elmwood Ave., BUFFALO • 2902 Commerce Bldg., NEW YORK CITY

What kind of Servicing can you expect when you buy German Machine Tools?

MEET A TYPICAL ORBAN SERVICE ENGINEER AT WORK right in a customer's plant, setting up a Gildemeister Turret Lathe at Special Screw Products, Inc., Bedford, Ohio, and instructing operators in its use. Or it might be a Lindner Jig Borer at Ford—a Cawi Grinder at Thompson Products—a Klopp Shaper at Textile Machine Works.

He's typical of a staff of factory technicians permanently stationed at Orban—men who have actually built the machines they install, demonstrate and service.

Three Service Centers

These engineers work out of our service centers in Cleveland, Detroit and Newark, N. J., where replacement parts are stocked for all normal maintenance needs. Where a special part or attachment is needed in a hurry, our direct teletype connection with our Dusseldorf, Germany office can speed it on its way within 24 to 48 hours.

Actually, though, we've found that the hundreds of machines we've installed in major plants from coast-to-coast have needed little or no service attention after installation. In fact, our engineers have been able to devote some of their time and skill to servicing foreign tools purchased elsewhere.

Tools built to American standards

One thing more: Every machine tool we distribute is designed for standard American voltages and frequencies; calibrations and lead screws are in inches. Our written guarantee of materials and workmanship for a period of six months accompanies each machine. Complete operating instructions in English are supplied.

That's what you can count on when you buy machine tools from Orban. Ask us about your requirements.

Send for current stock list

Lathes	Grinders
Milling Machines	Drill Pointers
Jig Borers	Power Hack Saws
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Drill Presses	Die Sinkers
Shapers	Slot Millers

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KURT ORBAN COMPANY, INC.

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Corrosion won't hurt this TRI-CLAD motor's cast-iron frame

REG. U.S. PAT. OFF.

HERE'S A COMMON SIGHT AROUND MANY PLANTS—A G-E Tri-Clad motor operating reliably and continuously under the extremely corrosive conditions that cause many other motors to fail.

THAT'S WHY YOU CAN EXPECT superior performance from G-E Tri-Clad motors. Consider these facts:

CORROSION-RESISTANT CAST-IRON means longer motor life. Unlike steel, cast-iron resists corrosive pitting, even when the paint is chipped.

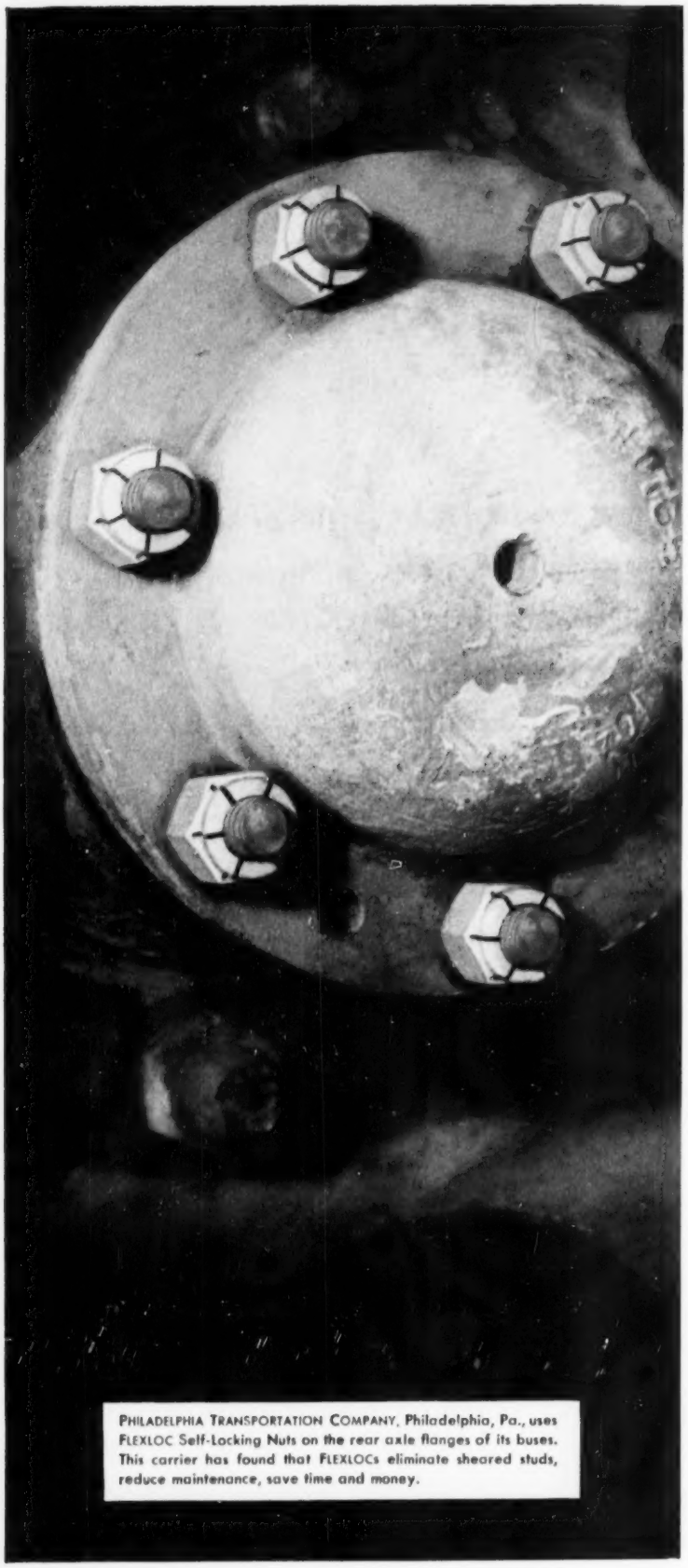
RIGID, CAST STATOR FRAME with integrally cast feet, can't be twisted out of line by accidental jarring or by excessive "bolt-down" pressure on the feet.

STRONG, CAST-IRON END SHIELDS have cast ribs for extra strength without adding extra weight . . . protect the true motor alignment even under heavy shaft loads.

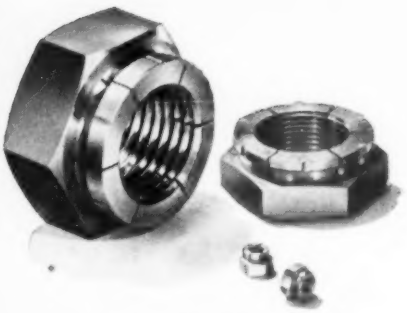
ORDER G-E TRI-CLAD MOTORS from your nearby G-E Apparatus Sales Office or G-E Agent or distributor. General Electric Co., Schenectady 5, N. Y. 752-19

You can put your confidence in—

GENERAL ELECTRIC



PHILADELPHIA TRANSPORTATION COMPANY, Philadelphia, Pa., uses FLEXLOC Self-Locking Nuts on the rear axle flanges of its buses. This carrier has found that FLEXLOCs eliminate sheared studs, reduce maintenance, save time and money.



How FLEXLOC locknuts work

FLEXLOCs lock and stay put on a threaded member regardless of the vibration encountered. Here's how they work. The slotted top or locking section is divided into six equal, flexible segments, closed in to make the inside diameter of the nut smaller than that of the companion bolt. When the FLEXLOC is applied, these are expanded by the bolt. The spring tension of the resilient segments locks the nut securely at any desired position on the bolt once the locking threads are fully engaged.

FLEXLOCs can be used over and over again. When expanded by the bolt, the locking section remains within the elastic limit of the metal. This permits the locking segments to return to their normal position, ready for reapplication to the bolt.

FLEXLOCs are one piece, all metal—nothing to assemble, come apart, lose or forget. They can be delivered in any quantity in a wide range of sizes. Stocks are carried by industrial distributors everywhere. Write for literature and samples. SPS, Jenkintown 1, Pa.

FLEXLOC®

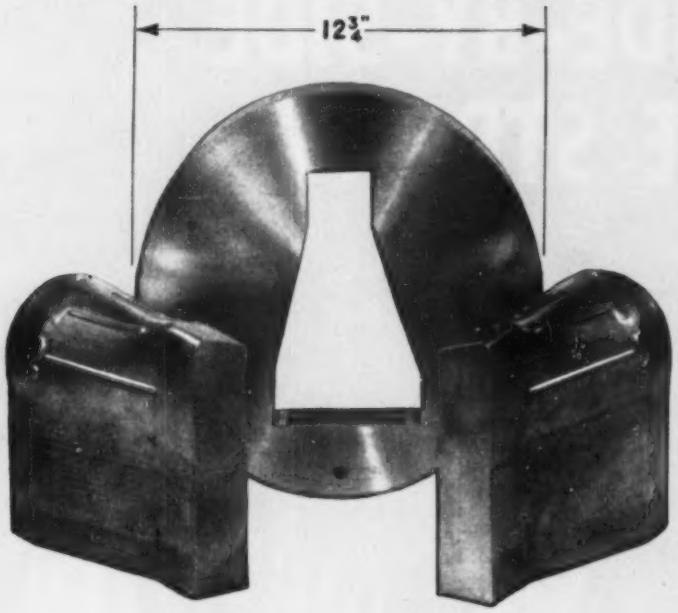
LOCKNUT DIVISION

SPS

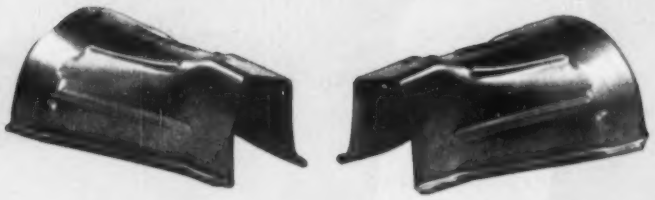
JENKINTOWN PENNSYLVANIA

Our Fiftieth Year : A START FOR THE FUTURE

Just this tooling ...



makes 2 drawn parts...



by Hydroforming

What would it cost you to tool this job?

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U.S.A.

HYDROFORM TOOLS ARE CHEAPER TO MAKE

The parts illustrated below are right-hand and left-hand sections of a stainless steel duct—a jet-engine component. The one draw ring shown was used to Hydroform *both* parts, by simply turning it upside down to draw the opposite section. The punches were made of cast iron, machined to shape.

Liberal clearance is permitted between the punch and draw ring—up to 50% of the thickness of the material being drawn. Punches can be made of inexpensive, easy-to-work materials—mild steel, brass, Kirksite, plastics—depending upon the material and shape of the part.

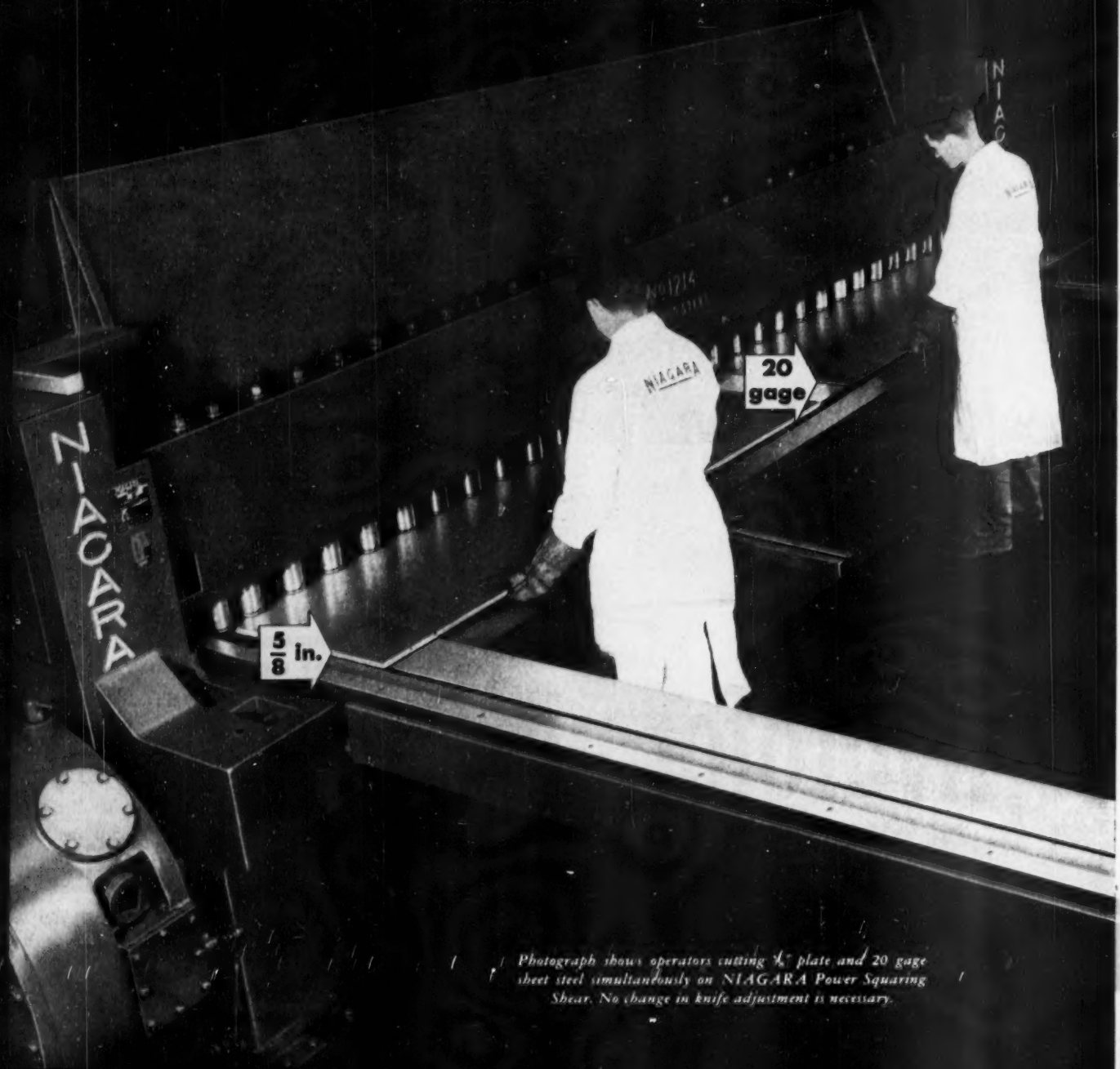
GET BETTER PARTS... BIGGER SAVINGS... BY HYDROFORMING

You'll save on tool costs, *certainly*, by Hydroforming—and produce parts of *higher* quality, in *fewer* operations as well. Bulletin M-1759-1 gives detailed information on this simplified deep drawing process. Write for your copy. For data pertinent to your production, call in a Cincinnati Milling field engineer.

CINCINNATI

Hydroform

CUTTING 20 GAGE and 5/8" PLATE SIDE-BY-SIDE AT ONE STROKE



Photograph shows operators cutting ⅝" plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration. Visitors at our plant can see this done every day. There is no necessity for tinkering with the knife adjustment.

Demonstrates The Sound Engineering Design of

NIAGARA

POWER SQUARING SHEARS

● There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

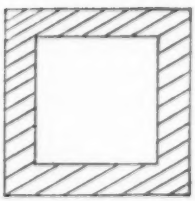
Accurate cutting depends primarily on rigidity of the shear's components.

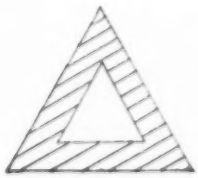
For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

The economy of quality is remembered long after price is forgotten.





BED, CROSSHEAD & HOLDDOWN DESIGN

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

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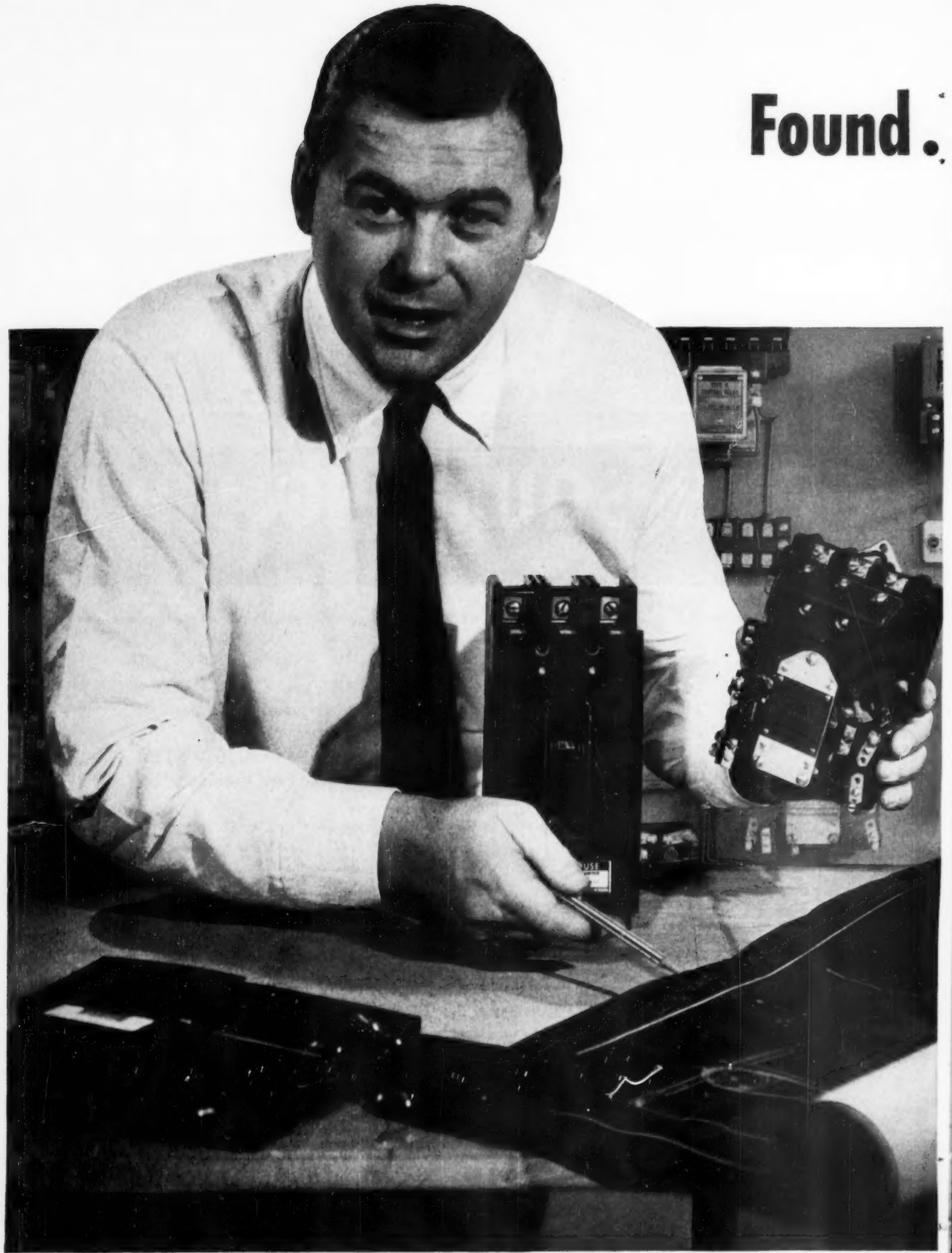


..a new way to better machine control panels

Match proved protection of Westinghouse AB Circuit Breakers with the dependability of Westinghouse Motor Control

Why? Because Westinghouse Motor Control will give you top performance in your *entire* control panel—performance that you've always had with Westinghouse AB Circuit Breakers. With Westinghouse Control, you get the same dependability and versatility. You can build panels that do more work, faster, with greater accuracy, with less attention, with complete protection. Panels that will make your machine easier to sell.

Both Westinghouse Circuit Breakers and Control provide the greatest variety of functions in the fewest possible units. The result? Flexibility in use and arrangement of panel components, savings in space, speed in mounting parts.

Here are two of the exclusive advantages in Westinghouse Linestarters® that will give you maximum dependability for millions of cycles.

1. Knife-edge bearing on which is mounted Life-Line's only moving part. No sliding members to cause binding friction, mechanical wear, electrical failure.

2. Bimetallic disc-type principle of overload protection—snap-action protection that cannot fatigue, never fails. The Westinghouse Bi-metal Relay retains precise calibration because it is not affected by aging, oxidation or repeated resetting. Attempt all the "hot" resets you want—it won't fail.

Get full value—in designing, in buying, in mounting, get the advantages of both Westinghouse Circuit Breakers and Motor Control. Your Westinghouse Representative will be glad to assist in application problems, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

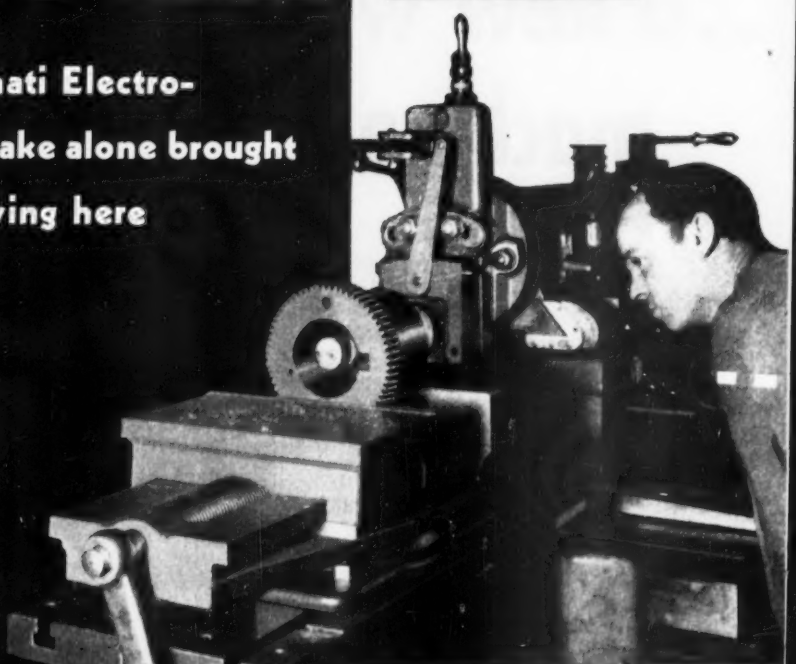
J-30163

YOU CAN BE SURE...IF IT'S

Westinghouse

Outstanding Time Saver...

The New Cincinnati Electro-Magnetic Clutch and Brake alone brought a 30% time-saving here



The New Cincinnati Magnetic Clutch and Brake, with its single, convenient control lever, gives the operator the fastest, simplest and most accurate control of his Shaper and converts waste time into productive time.

This powerful clutch and brake requires no adjustment, and has a long, maintenance-free life.

Write for Cincinnati Shaper Catalog N-5.

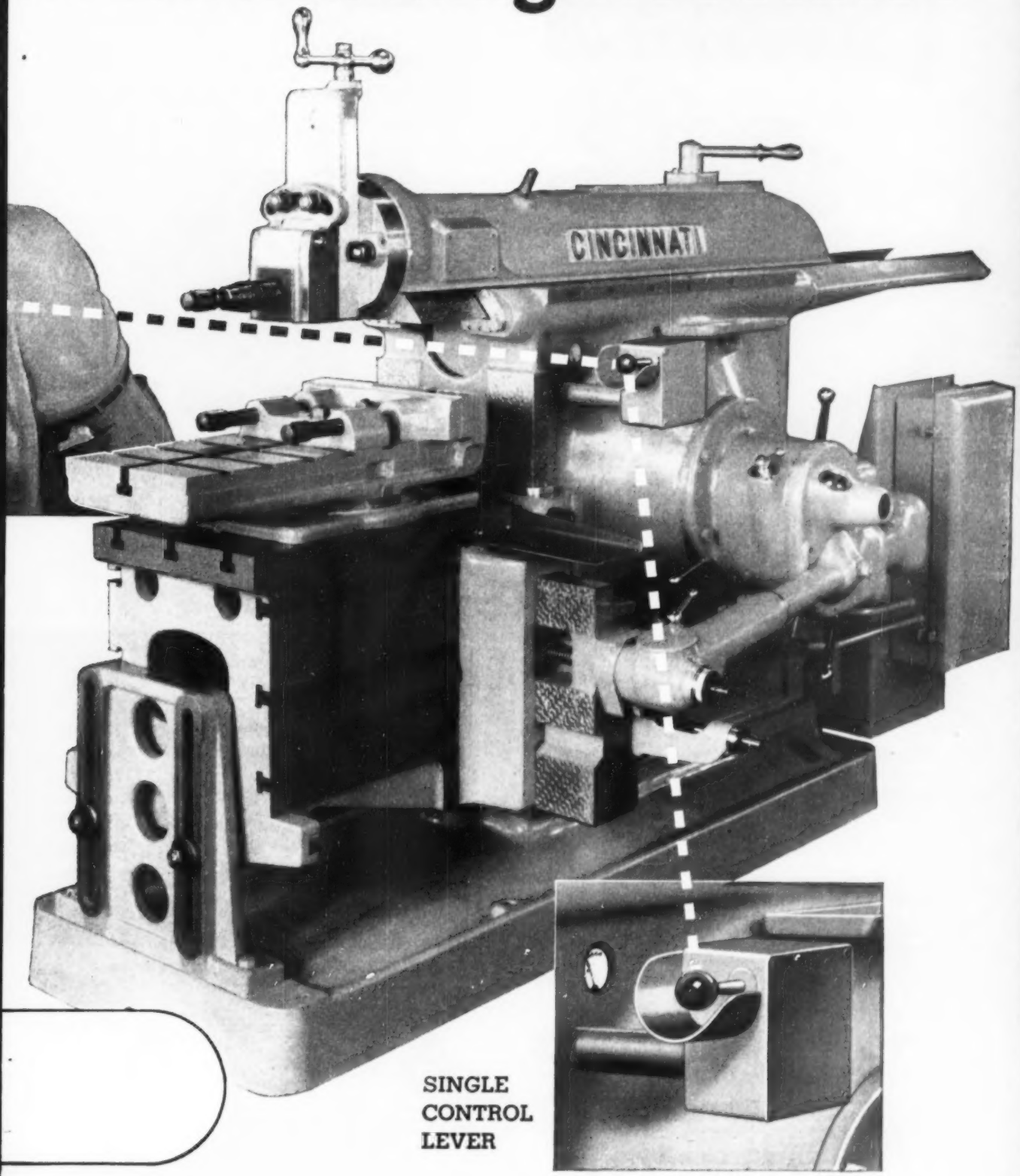
Shaping time on 7 internal oil grooves in these steel sleeves was reduced from 12.5 minutes to 8 minutes, by the Cincinnati Electro-Magnetic Clutch and Brake.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

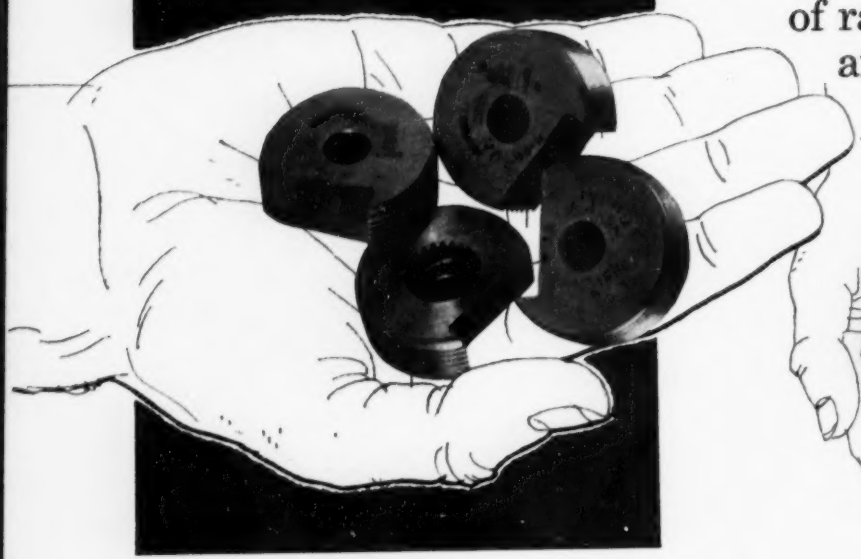
....Outstanding ACCURACY



SINGLE
CONTROL
LEVER

1 SET of ground thread circular chasers cuts more threads...

than 10 SETS of radial hobbed and lapped chasers



another reason why so many production shops standardize on

VERS-O-TOOL

with GROUND THREAD CIRCULAR CHASERS

With circular ground thread chasers, you grind 200 times and up—to a full 270° of their circumference; with radial type you average 4 grinds.

With circulars, you vary the grind with the right hook and clearance to suit any material; with radials your grind is fixed, usually limited to one material, one job.

With the circular chaser Vers-o-tool System you use the patented Micrometer gauge—every regrind is identical, insuring precise uniformity of threads. You avoid adjustments, scrap loss and save time—reduce your chaser costs 10 to 1 or better, over radial chasers.

Ask for Catalog DT-52

The NATIONAL ACME CO.

170 East 131st St. • Cleveland 8, Ohio.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

CHALLENGE TO OBSOLESCENCE

By the time you've used up two sets of circulars you will have saved enough to pay for the entire Vers-o-tool installation.

The difference in life and in performance between ground thread circular chasers and the old conventional type as proved in shop after shop enables us to make this guarantee.

24-hour deliveries on most standard stockable NC and NF chasers and blocks—also National taper pipe and dry seal.

Style DS Vers-o-tool (Non-revolving Type) 10 Sizes, ⅜"—6½".

Style DR Vers-o-tool (Revolving Type) 13 Sizes ⅜"—6½"

Style DBS Vers-o-tool (for B&S Automatics) 3 Sizes, ¼"—⅝".

Ground thread circular chasers and their holding blocks are interchangeable, die size for die size, among all styles of Vers-o-tool automatic heads.

REYNOLDS ALUMINUM CAST PLATE AND BAR

A Revolutionary Material for Low Cost Tools, Dies and Fixtures

Reynolds cast aluminum plate and bar of high dimensional stability offers better performance, and longer production life than other low cost tool and die materials. First proved superior in the aircraft industry, cast aluminum plate and bar is now used in many other industries when short to medium production runs and experimental tools and dies are a problem.

Included among the outstanding features of Reynolds cast aluminum plate and bar are fine grain structure; precision surfaces; high strength; light weight; low cost; fast, free-machining; excellent thermal characteristics and a wide range of standard sizes.

For full details on Reynolds Aluminum Cast Plate and Bar, call your nearby Reynolds office listed under "Aluminum" in the classified telephone directory, or write Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

Write for free catalog, "Reynolds Aluminum Cast Plate and Bar for Machine Shops, Foundries and Pattern Shops."

Be sure to see "Mister Peepers" every Sunday night, 7:30 EST, NBC-TV; hear "Fibber McGee and Molly" every Tuesday night, 9:30 EST & PST, NBC.

REYNOLDS ALUMINUM

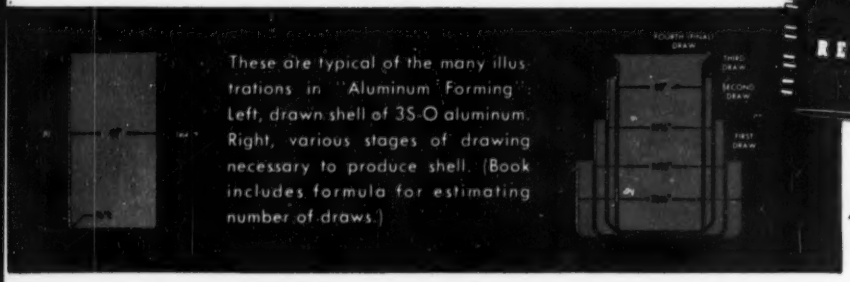
MODERN DESIGN HAS ALUMINUM IN MIND

"ALUMINUM FORMING"

Technical Handbook

Write Today! Free when requested on business letterhead.

Everyone who works with aluminum should have this new 148 page handbook, the latest addition to the Reynolds Technical Library. "Aluminum Forming" was published so that design engineers and plant supervisors could have, in a single volume, complete information on the proper techniques for working aluminum. Design and fabricating practices with aluminum are not always like those for other metals. So, in some cases modifications or even special procedures may be required. This handbook fully explains all these procedures and includes more than two hundred and thirty drawings and photographs, twenty-two tables and thirty-two formulas.



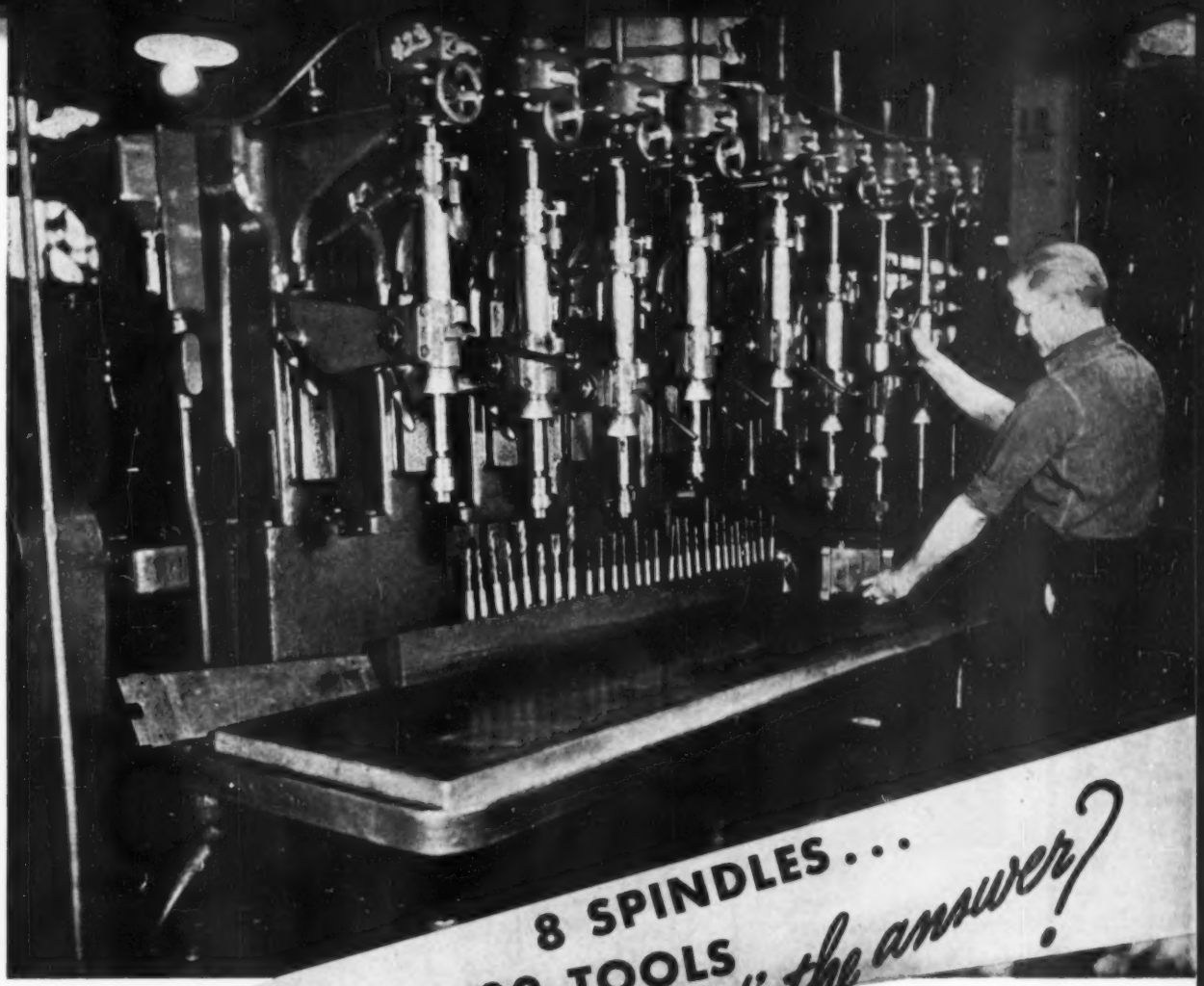
These are typical of the many illustrations in "Aluminum Forming". Left, drawn shell of 35-O aluminum. Right, various stages of drawing necessary to produce shell. (Book includes formula for estimating number of draws.)

Be sure to see "Mister Peepers" every Sunday Night, 7:30 EST, NBC-TV; hear "Fibber McGee and Molly" every Tuesday night, 9:30 EST & PST, NBC radio.

For your free copy of the valuable Forming handbook plus a complete index of Reynolds technical literature, write on business letterhead (otherwise price of book is $1.00). Reynolds Metals Company, 2523 South Third Street, Louisville 1, Kentucky.

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



MODERN-MAGIC
CHUCK AND COLLET EQUIPMENT

The above set-up is a typical example of what can be done with MODERN Magic Quick Change Chuck and Collet equipment. Here, four spindles of the machine, equipped with MODERN Magic Chucks, perform twenty-eight separate operations.

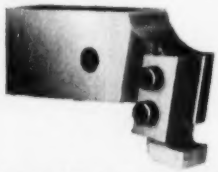
The twenty-eight tools are easily and quickly changed without stopping or even slowing the machine. Bulletin M-101 gives complete details on MODERN Magic Quick Change Chuck and Collet equipment. Send for your copy today.

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

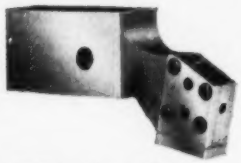
MODERN TOOL WORKS
DIVISION
CONSOLIDATED MACHINE TOOL CORPORATION
SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED
ROCHESTER, NEW YORK

GREENLEE *Automatics*

Circular Form-Tool Holder

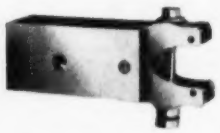


Dovetail Form-Tool Holder

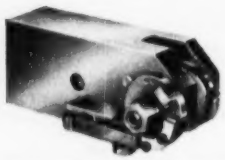


Bit-Type Form-Tool Holder

Cut-Off Tool Holder

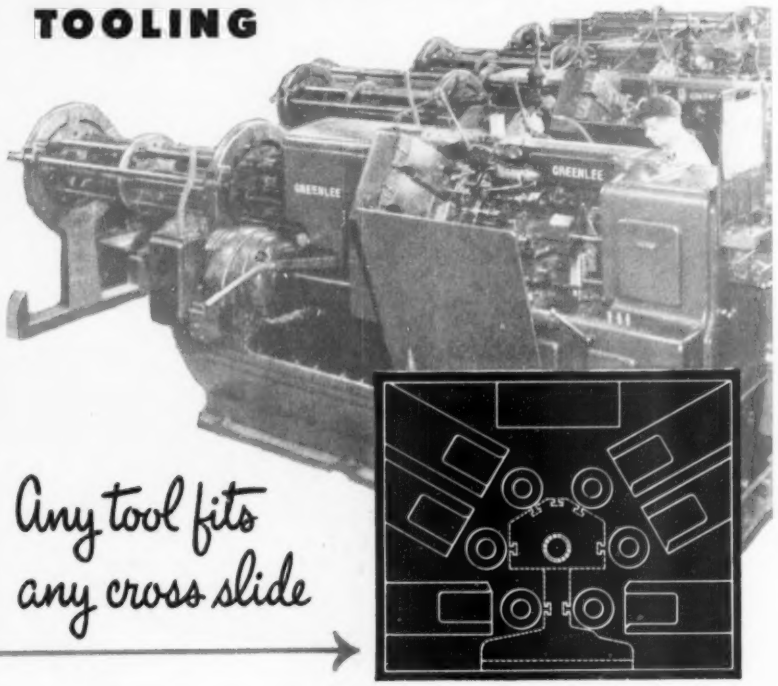


Knurling Tool Holder



Stenciling Wheel Holder

INTERCHANGEABLE TOOLING



Any tool fits any cross slide

SAVE TIME AND MONEY REDUCE JOB COSTS

Among the cost-saving features of Greenlee Automatics, one of the most advantageous is the arrangement whereby *any* of various standardized tool holders will fit in *any* of the six cross-slides. This means not only no limitations as to what tools can be used in which positions, but also a minimum requirement for investment in tools, and a maximum of speed in tool setting when changing over between jobs. *You can profit* from this and the many other outstanding features of Greenlee Automatics.

Write for FREE Literature

Send today for your copy of our 20-page booklet describing and illustrating all the Greenlee features.

PRODUCTION MACHINERY

GREENLEE

GREENLEE BROS. & CO.
1724 MASON AVE., ROCKFORD, ILL.

Currently, draw dies of Carboloy cemented carbide are speeding up production on everything from shoe eyelets to .30 cal. brass cartridge cases and 155 mm. brass and steel shell casings. Send coupon for details on carbide draw dies.

Carbide dies outdraw steel dies 10 to 20 times on shell cases

Field engineering – At your call, a Carboloy die expert will drop around to your plant and help solve your carbide die problems. Call him whenever you want on-the-spot answers on design and application of carbides in dies.

Die training school – Courses in design, application and maintenance of carbide dies are given free at Carboloy Die School. Plan to enroll your men now. Send coupon for information.

Dies equipped with Carboloy cemented carbide really stand up in production of steel shell cases. Even under terrific hour-after-hour continuous drawing, they wear 10 to 20 times longer than steel dies and deliver an extremely high finish.

Other drawing applications – similar benefits. Such benefits are not unusual from Carboloy drawing dies. On some applications, they'll outwear other dies by 50 to one. The same holds true for blanking, forming and piercing dies made of Carboloy cemented carbide.

Naturally, when dies wear like this, you get greater production with less downtime and maintenance . . . fewer rejects and less finishing . . . cash savings all down the line.

Whether you make or use press dies, simple or complex, for any die operation, explore the possibility of applying Carboloy cemented carbide to those dies. You can order Carboloy cemented carbide in finished or in rough form from Carboloy Department. On blanking dies, order rough carbide direct from Carboloy Department to be finished in your own or tool maker's die room. Expert Carboloy die specialists will assist you in carbide die design and application.

To get a better idea of the wide range of carbide dies and free Carboloy die services, send coupon.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

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- ☐ Rush me free Carboloy Die Engineering Manual D-124.
- ☐ Send complete details on Carboloy Die School.
- ☐ Have a Carboloy field representative call at my plant.

Name _____ Position _____

Company _____

Address _____

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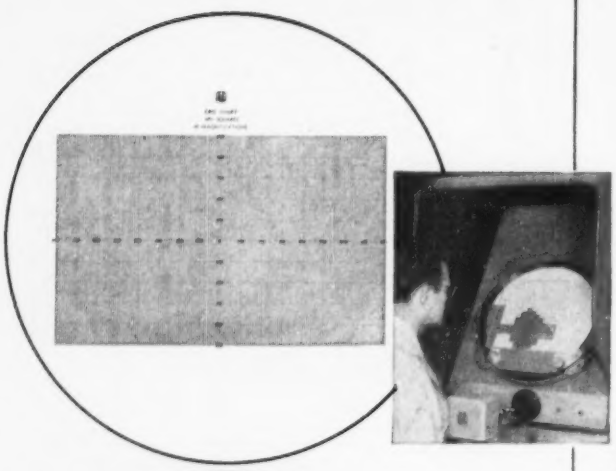
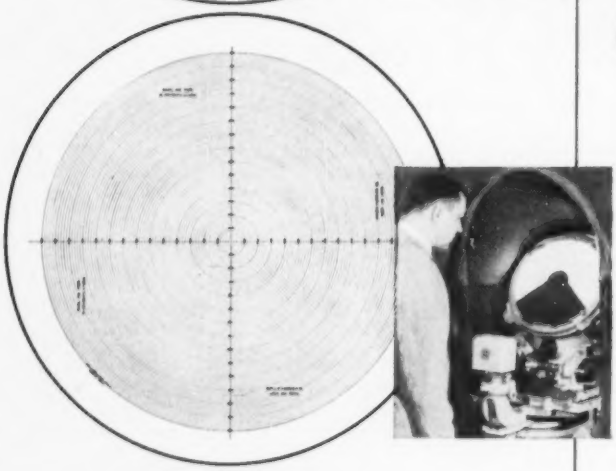
"Carboloy" is the registered trademark of the Carboloy Department of General Electric Company





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With these charts many ***Difficult Inspection Operations Become Routine Jobs.***

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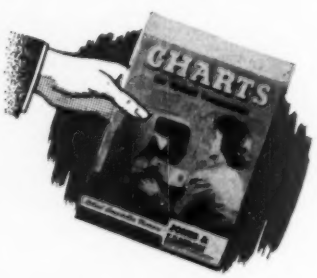


Write to Dept. 710 for your copy of our Chart Catalog No. 471.

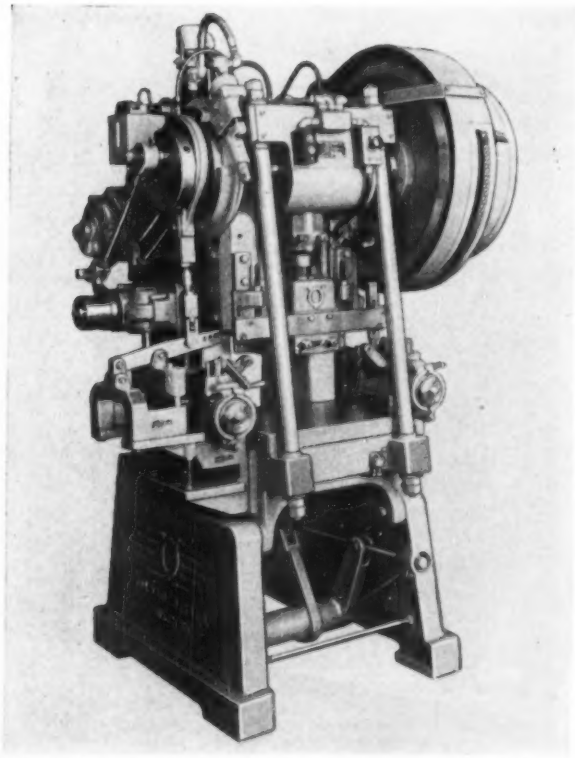
JONES & LAMSON

Machine Tool Craftsmen Since 1835

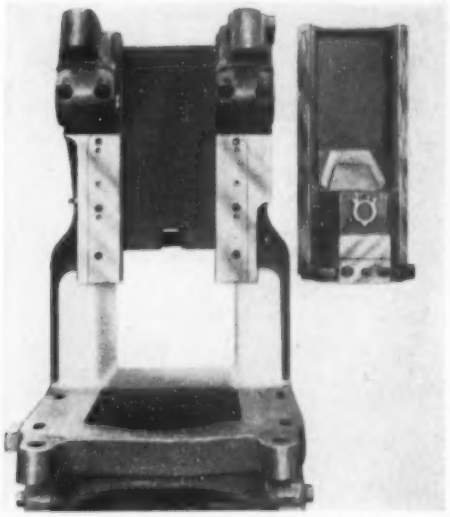
JONES & LAMSON MACHINE CO., 502 Clinton St., Dept. 710, Springfield, Vt., U.S.A. **OPTICAL COMPARATOR DIV.**

Precision *all through* the power stroke is what makes precision stampings. Of course, the tools must be made accurately and set up right. But no tools can work more precisely than the machine that operates them.

FOR PRECISION STAMPING GO V & O



Plenty of room to attach tooling. Special engineering if you want it. Special equipment if you want it. You get the right degree of quality control at the right cost when you go V & O.



Long slides on V & O presses minimize the possibility of angular misalignment during the power stroke. Accuracy in every working member, stiffness in every load bearing part: these are only a few of the features that assure precision all through the power stroke on V & O presses.

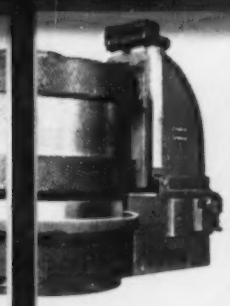
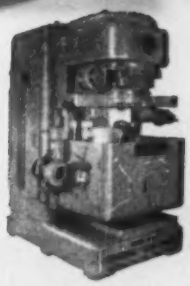
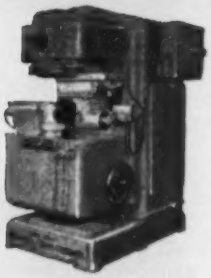
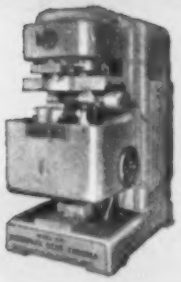
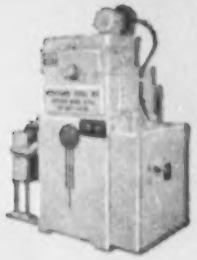
We would like to show you all the reasons why V & O presses deliver precision all through the power stroke. A representative is near you.

Only the best is good enough

DESCRIPTIVE CATALOGS containing complete specifications and operating details on V & O Precision Power Presses and Feeds are available. Please write The V & O Press Company, 301 Union Turnpike, Hudson, N. Y.

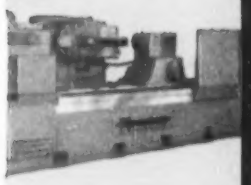
THE V & O PRESS COMPANY
Division of Emhart Mfg. Co.
BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889
HUDSON NEW YORK

Editors previewing
180" vertical
shaver
V-180 GEAR FINISHER
GEAR CUTTING
GEAR FINISHING
Complete Equipment
For Gear Production
GEAR LAPPING
GEAR CHECKING

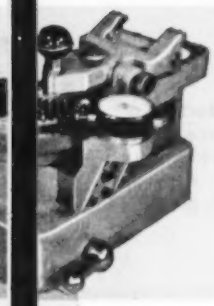
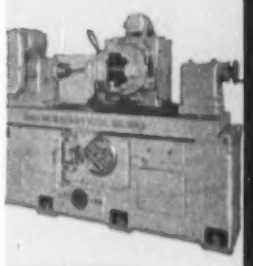






News....

for PRODUCERS of BIG GEARS



Large spur, helical, or herringbone gears with or without integral shafts, from 20 inches to 15 feet in diameter and up to 48 inch face width, as well as internal gears up to 48 inch diameter, 30 inch face width, can now be finished to high accuracy at far lower costs. Michigan's four new standard vertical shaving machines are designed for finishing large gears for marine, railroad, power plant, ordnance, and other applications. These V-series machines offer the following advantages:

1. **Drastic reduction if not complete elimination of costly and time-consuming lapping.**
2. **Great reduction in shaving time.**
3. **Ability to produce more accurate large gears than by any other process. (Accuracies down to three-tenths of a thousandth on 15-foot-gears.)**
4. **Ability to cut hobbing time by use of multiple thread hobs.**
5. **A standard machine (plus integral gear checking accessories) that provides high versatility in large gear manufacture.**

Large gears finished on Michigan Vertical Shavers are more accurate, have longer life and higher load carrying capacity. They operate more smoothly with a marked reduction in noise.

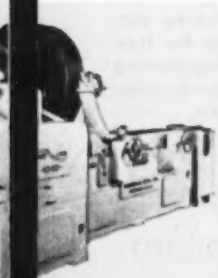
Write for Bulletin No. V-53

GEAR PRODUCTION HEADQUARTERS

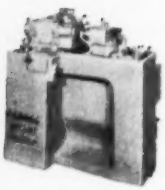
MICHIGAN TOOL Company

Complete — from blank to finished gear — equipment

7171 E. McNICHOLS RD. • DETROIT 12, MICHIGAN, U. S. A.

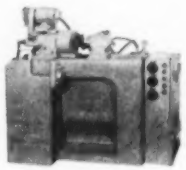


bryant
internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".

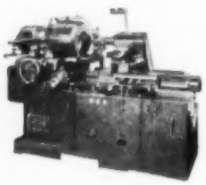


no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".

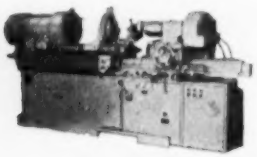
no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



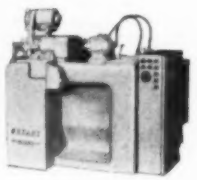
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



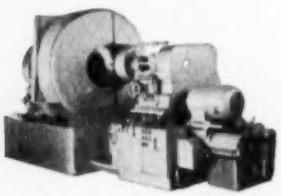
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

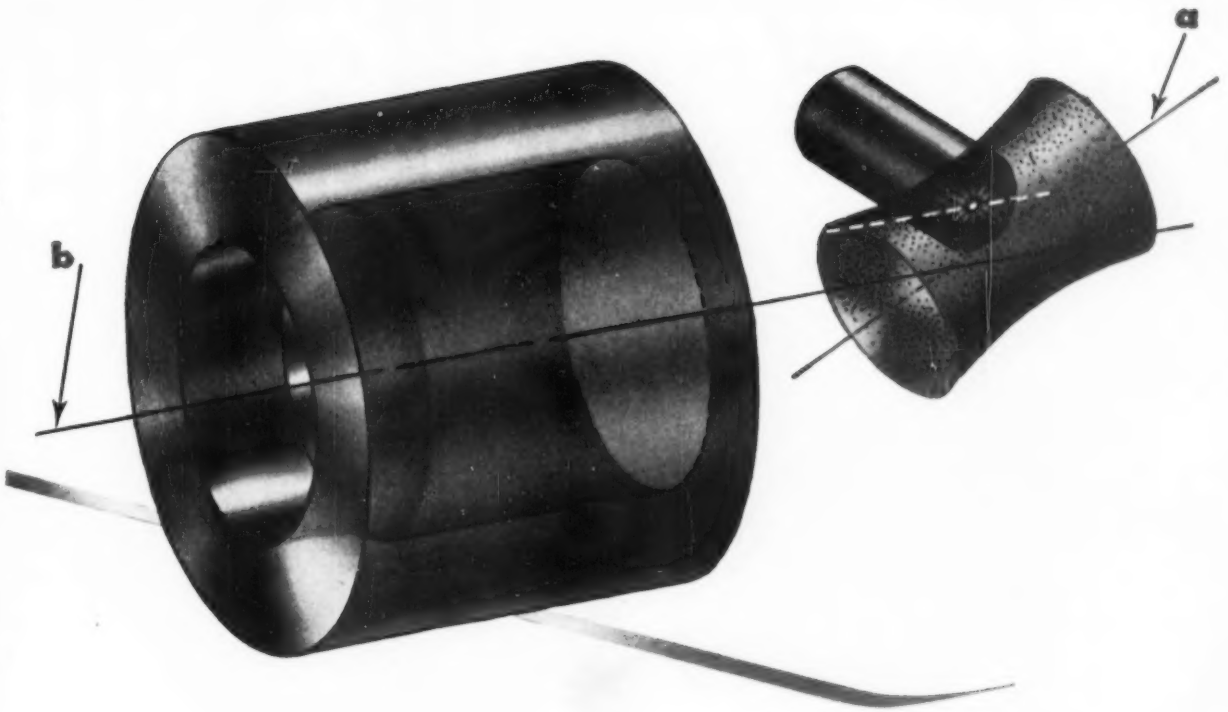
A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".

"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



IT is generally believed in internal grinding that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder. In our illustration the wheel is tipped as it passes the diamond and an hourglass form is generated on the wheel. This condition is not peculiar to an internal grinder. The same form is generated in turning an O.D. on a lathe if the tailstock is either high or low.

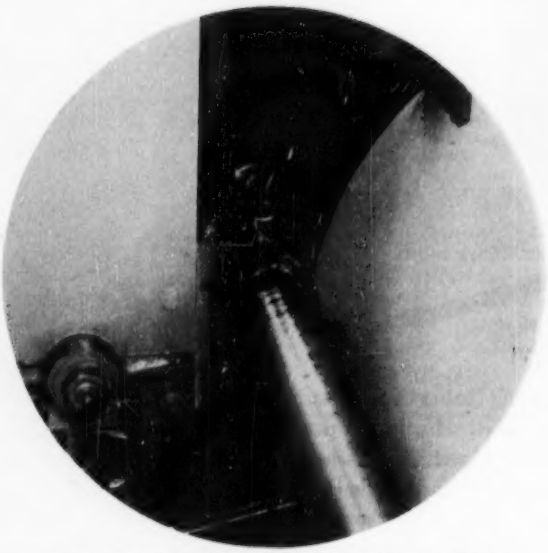
The path of the diamond is a straight line across the surface of the wheel, but the wheel will not contact the work on the same straight line. Contact may be at a point on each end of the wheel. Since the wheel does not contact across its full face, wheel wear will be excessive and the wheel will act soft.

The geometry of the hole may be upset as in the illustration, with the result that the back of the hole will be tight. Neither turning the workhead nor changing the length of traverse will correct this error. Because the wheel is contacting at either one or two points, instead of a straight line, the surface finish will be poor. The remedy is to correct the alignment by bringing the wheel center line "a" parallel with the path of the wheel and in plane with the work center line "b".

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

For the newest in coated abrasives... Watch



WANT TO TAKE OFF STOCK — FAST?

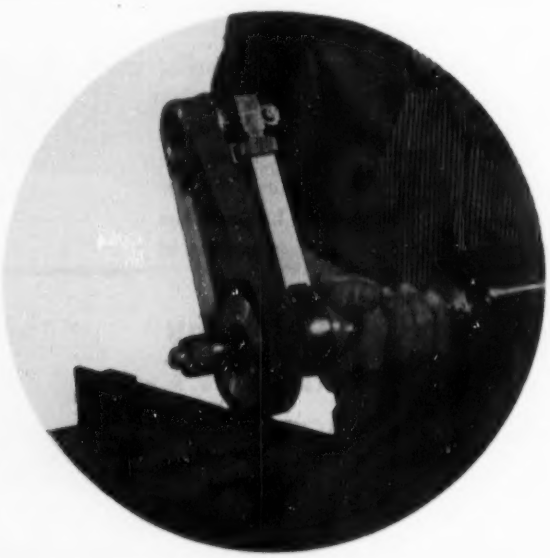
You can do it on bars or tubes to the tune of *one pound. per minute with* BEHR-MANNING METALITE® Cloth Belts on the #914 centerless grinder built by Production Machine Co., Greenfield, Mass.

WANT TO SHARPEN CARBIDE TOOLS?

Use a BEHR-MANNING Micro-Finishing DURITE Paper Belt on a Fenlind Micro-Finisher. This NEW method of finishing single point carbide tools offers many interesting advantages over present conventional grinding methods. Note: the Fenlind Micro-Finisher is manufactured by the Fenlind Engineering Company, Rockford, Ill.

WANT A NEW VERSATILE TOOL?

The new ADAPT-A-BELT, developed and manufactured by the Curtis Machine Corporation, Jamestown, N. Y., is considered one of the most universal attachments ever built. Some of its many features are: abrasive belt tracking mechanism, simple and efficient abrasive belt tensioning, rigid steel construction, light weight, wide range of belt lengths, universal attaching clamps for quick and efficient attachment on practically any power tool.



WANT TO CUT COSTS ON SPECIAL JOBS?

Look over the many small operations utilizing coated abrasives, that are common in all plants. Then check on the many BEHR-MANNING coated abrasive tools, each designed for a special use, which when applied can cut costs right and left. These tools are all specially formed coated abrasives. A few are illustrated here. It may pay you to get the full story.

Behr-Manning!

Hardly a month goes by without some new profit-saving application of coated abrasives such as these few shown here, entering the manufacturing picture. Many of these are developed in *BEHR-MANNING*® engineering laboratories. Others are worked out by machine manufacturers in cooperation with *BEHR-MANNING* engineers. Your local *BEHR-MANNING* representative has up-to-the-minute information on these highly profitable developments. He'll be glad to give you the facts about these new applications which may help your production. Use his help.

For immediate data: on production finishing, write for "Blueprints for Faster Better Production"; on polishing, "How Polisher Pete Put Economy in Polishing." Both free. Address Behr-Manning Corp., Troy, N. Y., Dept. AM-4.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
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BEHR-MANNING® CORPORATION
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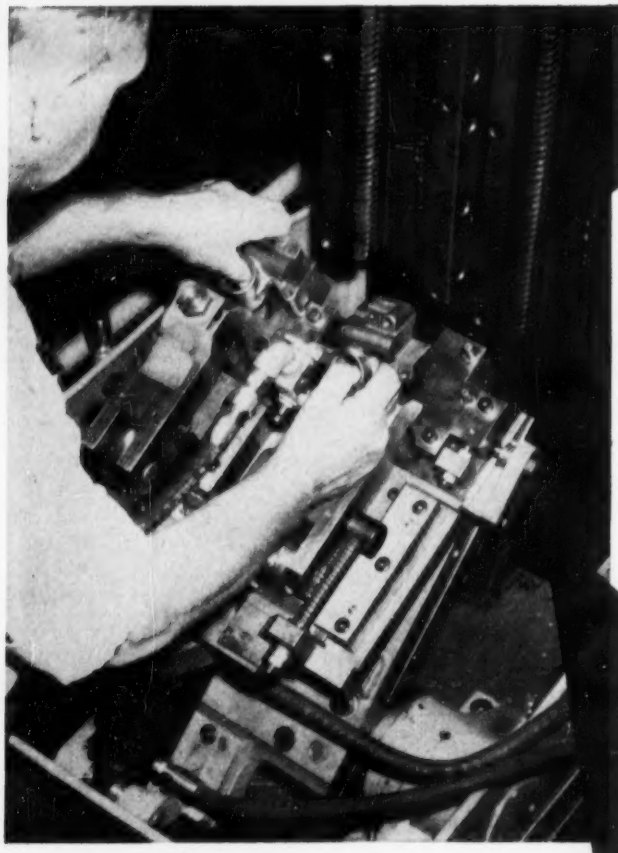
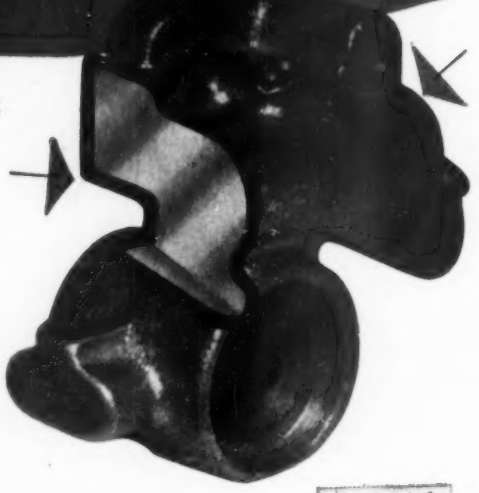
▲ COATED ABRASIVES ▲ SHARPENING STONES ▲ PRESSURE-SENSITIVE TAPES



FIXTURE AUTOMATICALLY TILTS, CLAMPS PARTS for GENERATING TYPE BROACHING

Speeds production of parking brake brackets designed and built the ***American*** *way*



Two parallel surfaces on each of two parts are straddle broached in one pass on this American SB-42-10 single ram broaching machine. Over 350 of these intricate parking brake brackets are completed every hour.

The complete tooling designed the American Way features:

1. **Generating type broaches.**
2. **Fully automatic work holding fixture with tilting table.**
3. **Automatic clamping and unclamping of parts.**

The operator simply loads and unloads the parts, starting each machine cycle by push button control.

For the answer to your broaching problem send a part-print or sample and hourly requirements to American . . . the organization that gives you the extra advantages of experience in producing all three . . . broaches, machines and fixtures. No obligation. Address Dept. A.

For more information on the American SB-42-10 and other American machines, write for Circular #300.

American BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

American Building - Ann Arbor, Michigan

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

CLEEREMAN DRILLING MACHINES

LOWEST Operating Costs!

Why?

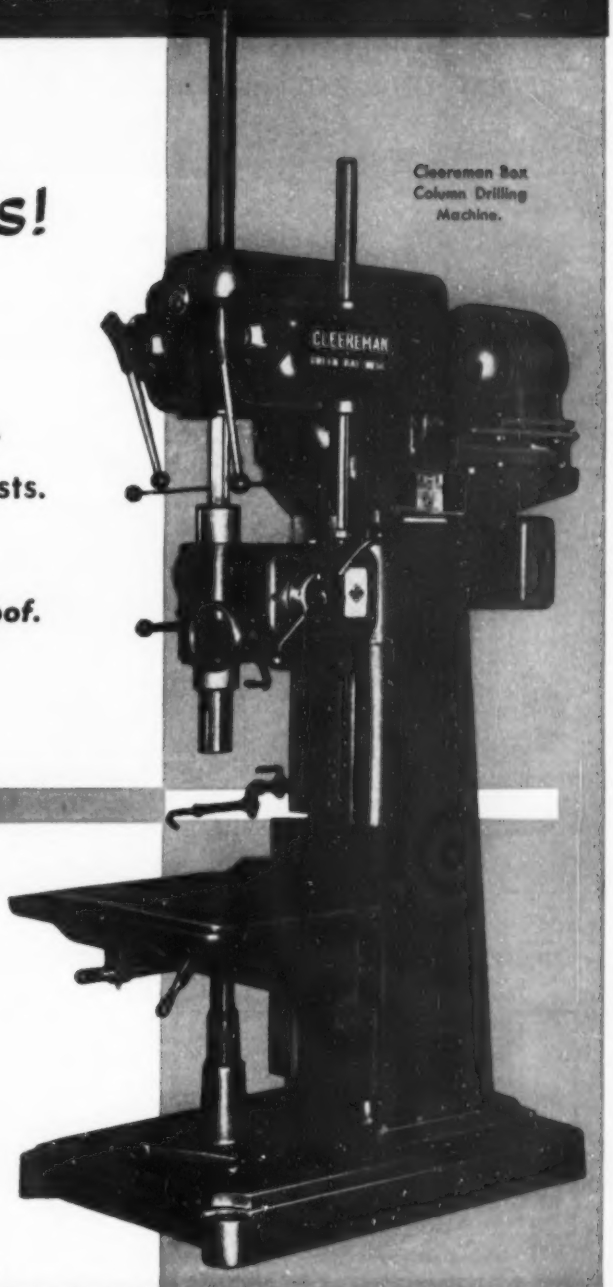
1—Eliminate Down Time.

2—More Power to Produce.

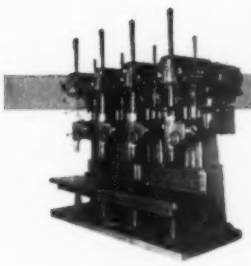
3—Lowest Maintenance Costs.

4—Less Operator Fatigue.

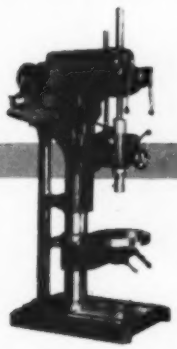
Go to any Cleereman user for proof.



Cleereman Box Column Drilling Machine.



Cleereman Multiple Drilling Machine.



Cleereman Round Column Drilling Machine.

General Office
400 West Madison Street, Chicago 6
Representatives in Principal Cities

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CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

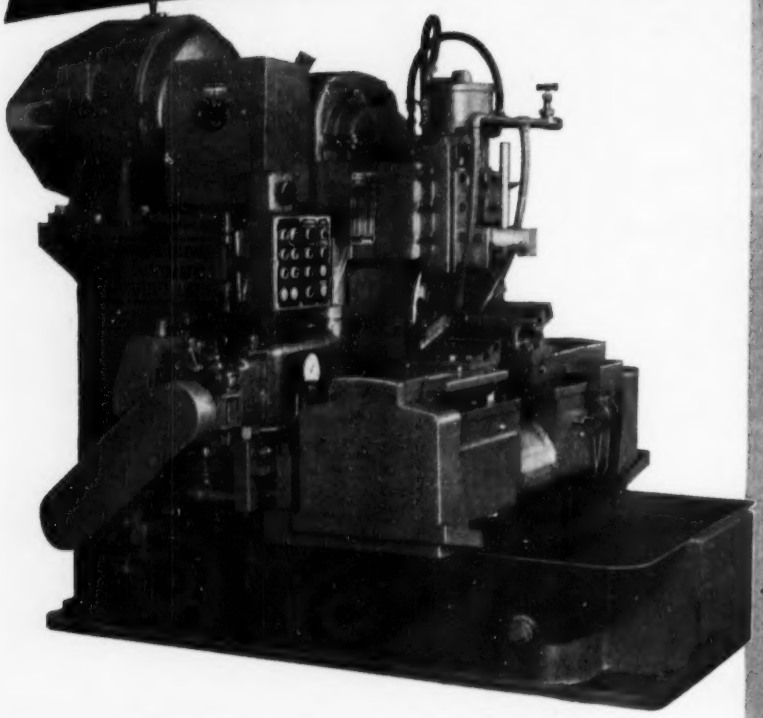
NEW BARDONS & OLIVER No. 38 and No. 39

(8 5/8" cap.) (9 5/8" cap.)

MILL TYPE CUTTING-OFF LATHES

✓FULLY AUTOMATIC FOR COUPLING WORK

✓SEMI-AUTOMATIC FOR CROPPING WORK



Featuring

HIGHER SPEEDS AND GREATER POWER FOR INCREASED PRODUCTION

- Spindle speeds up to 300 R.P.M. with up to 30 H.P. motor
- More rugged, dependable double tool slides
- Increased chucking power

Optional Extras

- Automatic or semi-automatic outside and inside chamfering attachments
- Speed accelerating device for cutting off solid bars
- Automatic stock loading tables
- Automatic stock unloading tables

ADDITIONAL SIZES OF BARDONS & OLIVER CUTTING-OFF LATHES			
No. 32 —	Capacity from	¼" dia.	to 2" dia.
No. 33 —	" "	½" dia.	to 3" dia.
No. 34 —	" "	¾" dia.	to 4" dia.
No. 35 —	" "	1" dia.	to 5-⅝" dia.
No. 36 —	" "	1½" dia.	to 6⅝" dia.
No. 38 —	" "	2⅜" dia.	to 8⅝" dia.
No. 39 —	" "	2⅜" dia.	to 9⅝" dia.
No. 312 —	" "	4½" dia.	to 12¾" dia.
No. 316 —	" "	6⅝" dia.	to 16" dia.

We also manufacture a complete line of Turret Lathes

BARDONS & OLIVER, INC.

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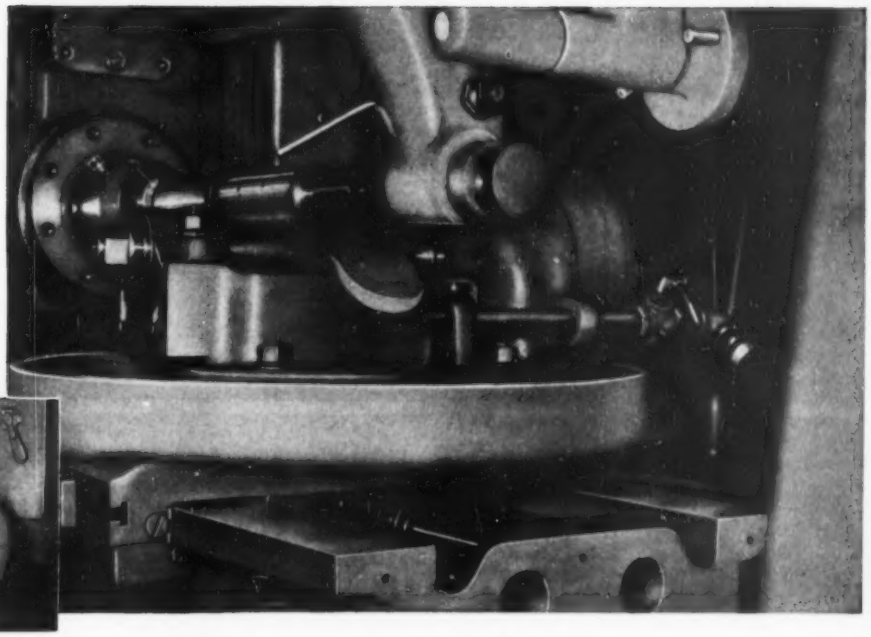

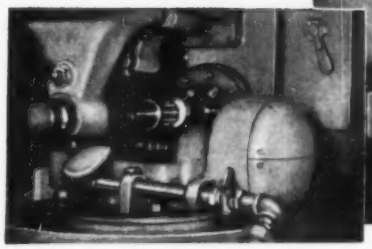

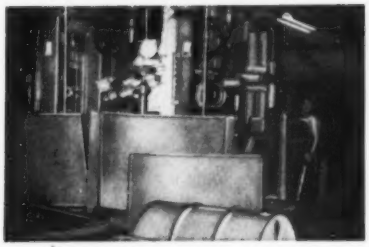

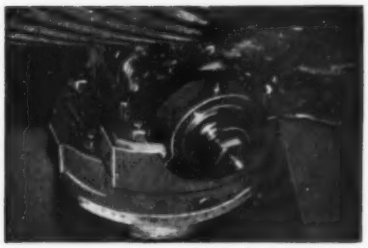

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at Timken-Detroit Axle Company

TOOL WEAR REDUCED 25%... MANUFACTURING COSTS ALSO CUT!

In an effort to reduce tool wear and cut manufacturing costs, the Wisconsin Division of Timken-Detroit Axle Company at Oshkosh called in Cities Service Engineers to make "on-the-job" tests.

Cities Service Lubrication Engineers made an on-the-spot study of the Timken-Detroit operation. This "on-the-job" evaluation by skilled Cities Service Engineers, long practiced in solving like problems, resulted in a recommendation for the use of a Chillo Cutting Oil that actually reduced tool wear 25% with proportionate savings in manufacturing costs!

WHAT ARE YOUR PROBLEMS? Why not take advantage of free, "on-the-job" testing? Call for our lubrication engineers at the office nearest you, or write Cities Service Oil Company, Dept. D4, Sixty Wall Tower, New York City 5, New York.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

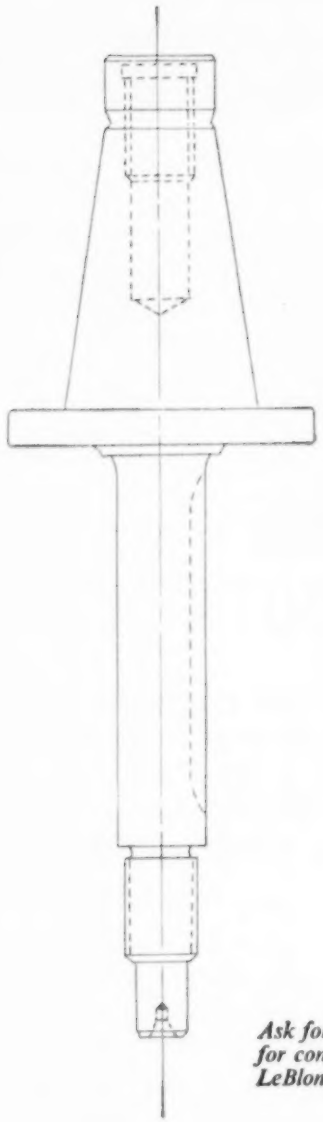
NOW SCULLY-JONES TURNS

four arbors instead of 3...

Hydra-Trace (Trade Mark Registered U. S. Pat. Off.) is LeBlond's heavy-duty hydraulic tracing attachment can be mounted in place of the compound rest on practically all LeBlond Lathes built since 1935

same time, same lathe...

plus "Hydra-trace"*



When defense needs mushroomed demand for production equipment, Scully-Jones & Co. of Chicago found itself jammed with orders for milling machine arbors (they make more arbors than anyone else). Acting on advice from engineers at LeBlond's Chicago Office, Scully-Jones added Hydra-Trace to their LeBlond 16" RT Engine Lathe. Now they turn out four arbors in the time formerly needed to produce three—same lathe, plus Hydra-Trace.

Besides boosting output, this template-controlled hydraulic tracer saves 45% on set-up time, gives uniform precision without the need of a highly-skilled operator.

Stepless form-turning, contour facing, and turning step shafts are all in a day's work for Hydra-Trace. *Fits all LeBlond Engine Lathes built since 1935,* can be mounted easily in a matter of minutes. Templates are flat, compact, suitable for both rough and finish turning. They can be produced readily in your own plant, stored in limited space.

When turning requirements call for increased output—with present machines or with new equipment—you'll find just what you need in LeBlond's complete line of lathes and lathe attachments.

Call your nearby LeBlond Distributor or write—

Ask for Bulletin HT2A for complete details on LeBlond Hydra-Trace.

turned faster by

LeBLOND of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

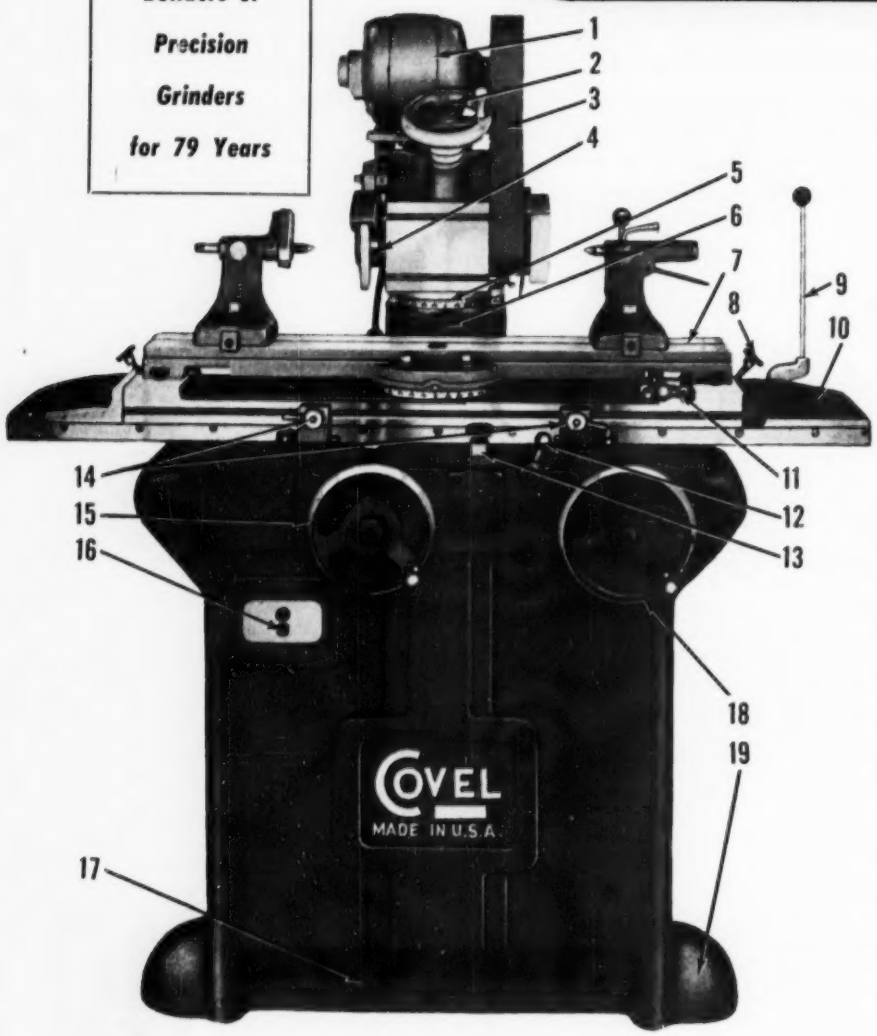
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 65 YEARS*

COVEL NUMBER 12

UNIVERSAL CUTTER AND TOOL GRINDER

all the features in its field — and moderately priced!

Builders of Precision Grinders for 79 Years



FOR SPEED, ACCURACY, LOW-COST PRODUCTION EASE OF OPERATION

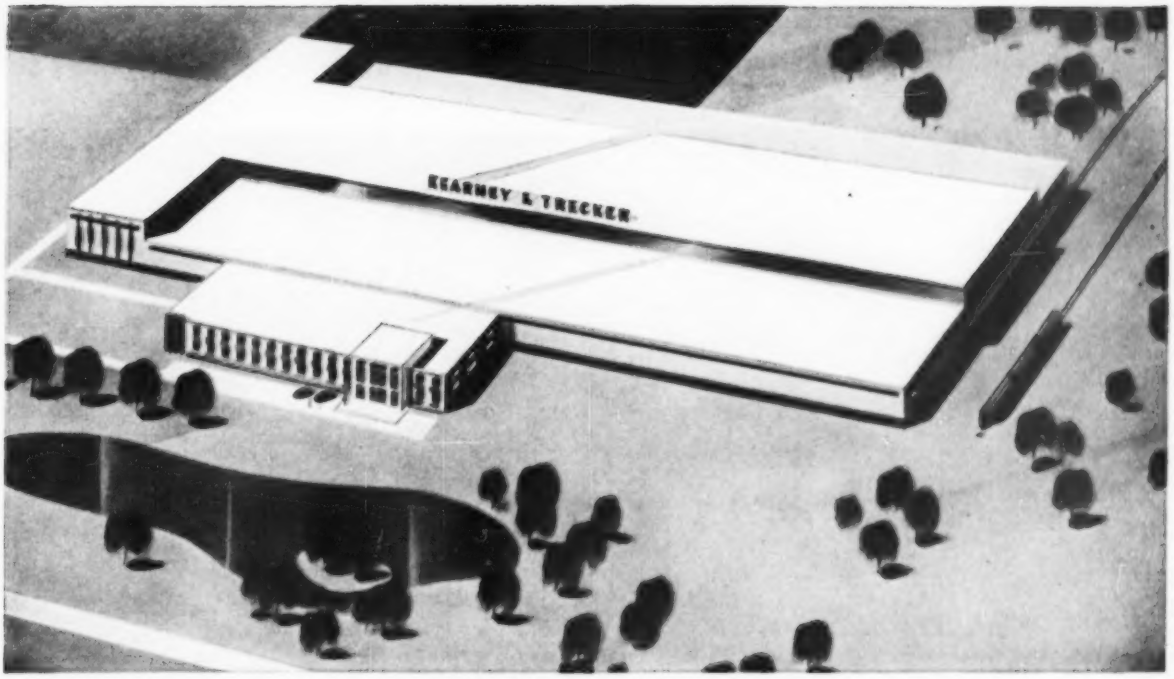
1. ¾ HP spindle drive motor conveniently located. Two-speed flat belt drive.
2. Elevating hand wheel with floating dial.
3. Belt guard easily removed.
4. Quill-type ball bearing spindle. Large, rugged and accurate. (Reversible optional.)
5. Head swings on vertical adjustable column (graduated).
6. Telescoping metal dust guards
7. Top table adjustable for taper grinding. Can be revolved 180° to increase capacity 3".
8. Quick-acting end clamps.
9. Hand-rapid table traverse lever is adjustable, convenient.
10. Table moves on anti-friction ball-bearing ways.
11. Fine screw table adjustment for taper.
12. Lock for sub-table (saddle and column locks also provided).
13. Table stops slide back, permitting dogs to pass.
14. Fine screw adjustable table dogs for limiting table travel.
15. Large graduated cross feed hand wheel with pointer.
16. All electric controls are convenient to operator.
17. Toe-room in front of base for operator comfort.
18. 2-speed hand wheel for longitudinal table travel.
19. Covers over hold-down bolts.

COVEL PRECISION GRINDERS

BENTON HARBOR, MICHIGAN

Write for **BULLETIN AM-43**

DRILL GRINDERS • UNIVERSAL CUTTERS & TOOL GRINDERS • HYDRAULIC & HAND FEED SURFACE GRINDERS



Here it is! Kearney & Trecker's new Special Machinery Division — nearly 200,000 sq. ft. of new plant with new tools and equipment. An experienced, fully-staffed team of sales, engineering and production experts is ready and waiting to serve you . . . by engineering new production methods.

INCUBATOR . . . for Production Ideas

This plant is being built for you . . . to engineer *new* production methods — to build the large or small special machines, tools and fixtures you need to improve production and cut costs.

Production behind schedule?

Costs going up, up and up?

Will special machines, special tools and fixtures or special arrangements of standard machines help you solve these problems?

Then why not be among the first to take advantage of the 5-million-dollar-plus investment that Kearney & Trecker is making in new plant, new tools and new engineering to help you solve them.

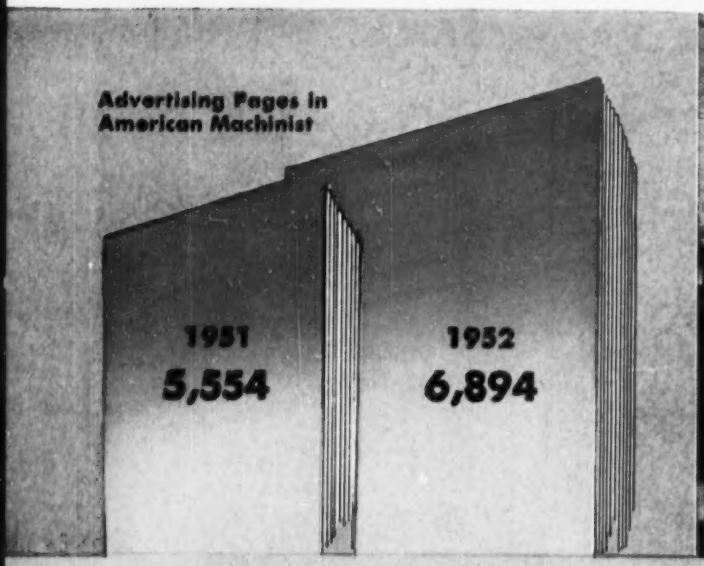
Kearney & Trecker *is no newcomer* to the field of special machine tools and allied special equipment. During the past 50 years millions of dollars worth of Kearney & Trecker special machinery has been produced for plants all over the world. And that doesn't include the 60,000 standard Kearney & Trecker milling machines and other machine tools so well known and so widely accepted everywhere.

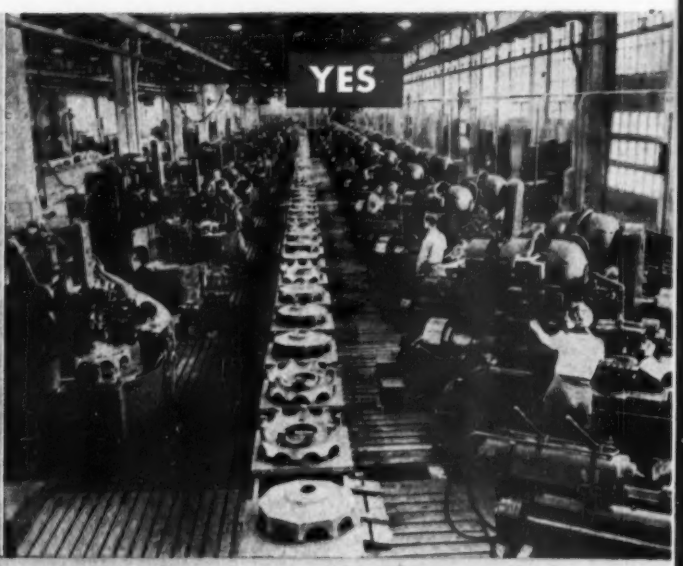
Kearney & Trecker is already working on new production ideas, new equipment and tool designs to be produced in this plant. Kearney & Trecker Special Engineering and Methods Analysts are ready right now to serve you with (1) Prompt response to your inquiry, (2) Immediate engineering help on your problem, plus, (3) The newest, finest and most complete facilities to build the special equipment you need — big or small.

Phone, write or wire The Special Machinery Division, Kearney & Trecker Corporation, Milwaukee 14, Wis., today. Get the facts about Kearney & Trecker's Special Machinery Division and how it can serve you.

KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

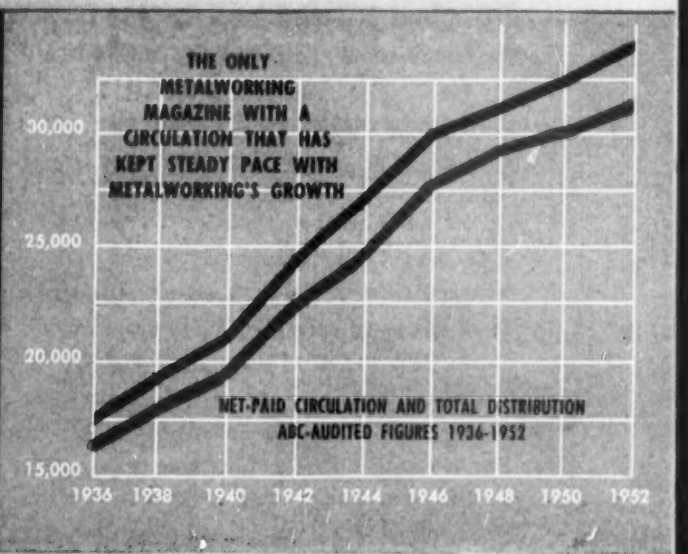
The Exclusive Values Over 800





When you seek the magazine that can best increase your sales to Metalworking, you will want to know why over 800 advertisers last year invested more advertising dollars in *American Machinist* than had ever before been invested in a metalworking publication.

You will quickly find that this magazine has many thousands more subscribers in metalworking plants than any other metalworking publication . . .



This concentration makes it possible for every *American Machinist* editorial page to be devoted to subjects of specific usefulness to metalworking production engineers and executives . . . with the result that these basic buyers decisively *prefer American Machinist* . . .

. . . prefer it so conclusively that more of them now subscribe to *American Machinist* than have ever before subscribed to any magazine edited for this biggest of industrial markets.

Advertisers Prefer Can Also Be Yours

. . . and that, for maximum impact and economy in selling to *Metalworking, American Machinist's* 31,000-plus subscribers are concentrated almost entirely within this biggest of industries, with a minimum of its circulation in such entirely different industries as *Metalproducing.*

Just as importantly, *American Machinist's* circulation is concentrated among the production engineers and executives who have Metalworking's most influential buying voice. For *American Machinist* is edited exclusively for these men who control or largely influence the purchase of every product used in Metalworking's production shops, and serves their interests more fully than any other magazine.

SO . . . when *you* want increased sales in the $100-billion Metalworking Industry, and want to build preference for your products among this industry's most important buying group . . . production management . . . the facts will tell you why:

This is the NO. 1 place to do business with America's biggest industry

THE McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION
McGRAW-HILL BUILDING, NEW YORK 36
PUBLISHED EVERY OTHER MONDAY
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS AND THE ASSOCIATED BUSINESS PUBLICATIONS

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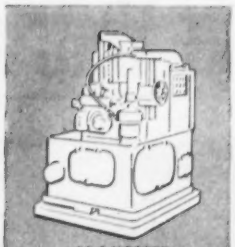
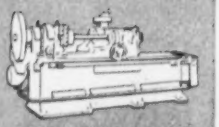


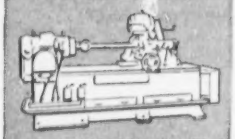
12-S HOBBER

7-A ROTARY HOBBERS

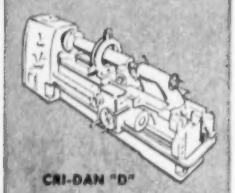


SH SPLINE HOBBER

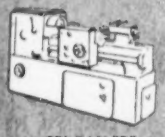
MODEL 40 THREAD MILLER



HT THREAD MILLER



CRI-DAN "D"

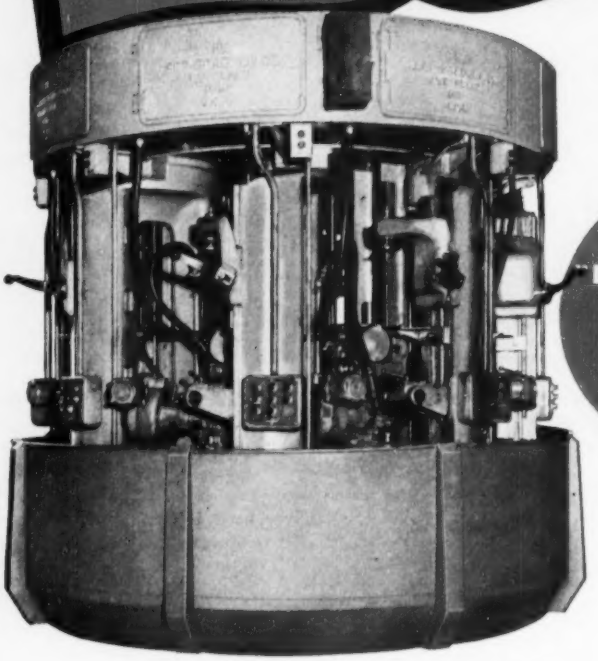


CRI-DAN "B"

HIGH PRODUCTION

TOUCH-BUTTON HOBBING

With Modern Lees-Bradner 7-A Rotary Hobbers



THE LEES-BRADNER MODEL 7-A 8-SPINDLE ROTARY HOBBER

Look to Lees-Bradner, pioneers in high-production machine tools, for the ultimate in precision hobbing.

The now famous line of Model 7-A hobbers have established remarkable records in leading production plants throughout the country.

No matter what your hobbing job, or the volume of production required, there's a machine to fill your needs in the 7-A line of eight, six and four spindle rotary hobbers or the single-spindle machine.

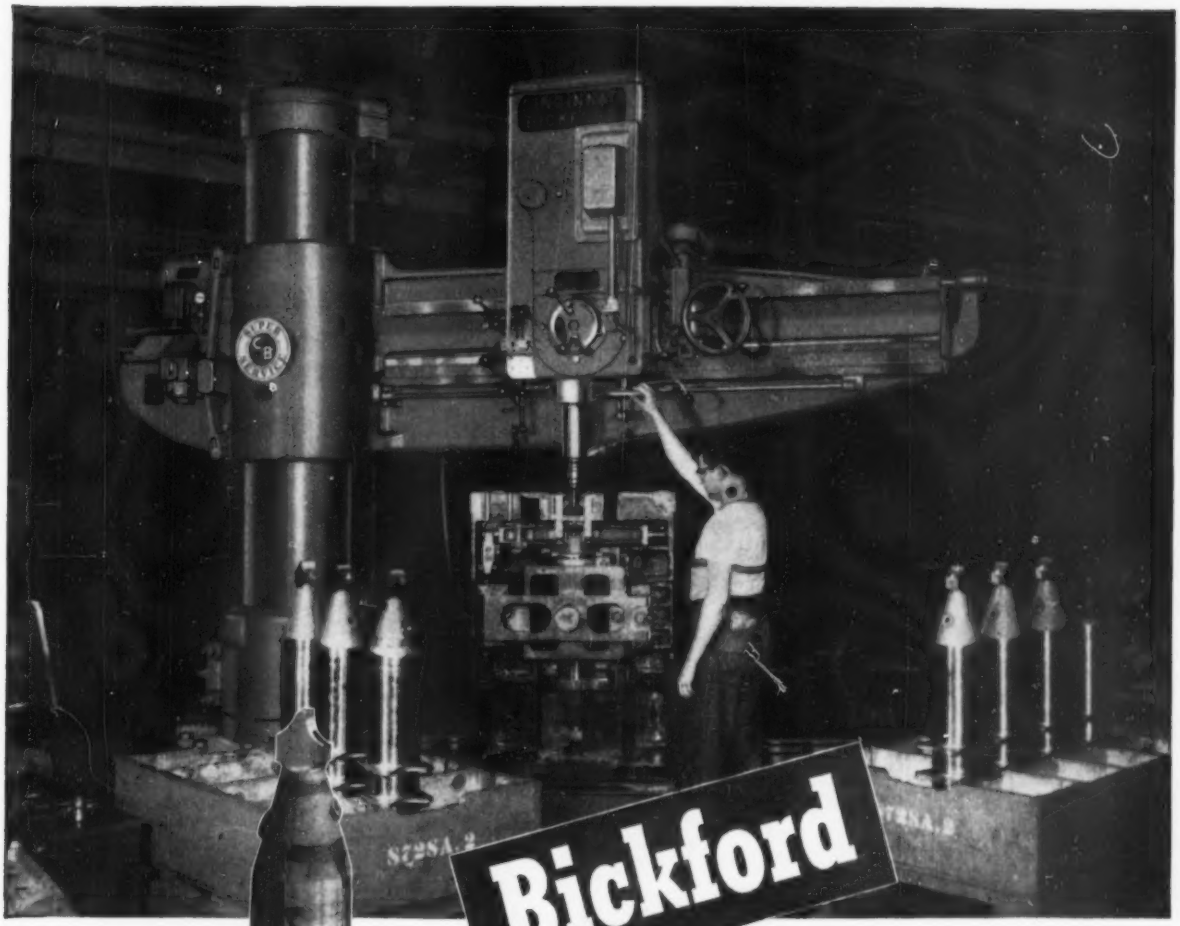
For detailed engineering and production data call in your Lees-Bradner representative or write the company direct.

QUICK FACTS ON THE MODEL 7-A HOBBERS

- **Push-Button Production Controls**
- **Electric Hob Shifter**
- **Electronic Counter for Longer Hob Life**
- **Patented Automatic Hob In-Out Mechanism**

the LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.



Photos courtesy—The Cleveland Pneumatic Tool Company, Cleveland, Ohio.

Bickford gives *complete* satisfaction . . .

The convenient centralized controls, the wide range of speeds and feeds, and the high visibility head of this Cincinnati Bickford Radial Drill are all contributing to fine performance on this job.

The Cleveland Pneumatic Tool Company say "Performance and ease of handling are all that could be desired."

On this cylinder for an aircraft nose type landing gear, drilling, reaming and spot facing operations are being done.

Cincinnati Super Service Radial Drills are accurate, powerful and profitable in the shop.

Write for Bulletin R-29.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

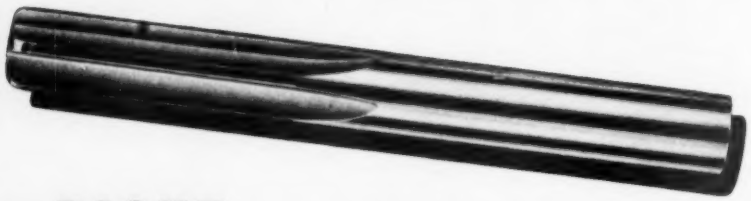
THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

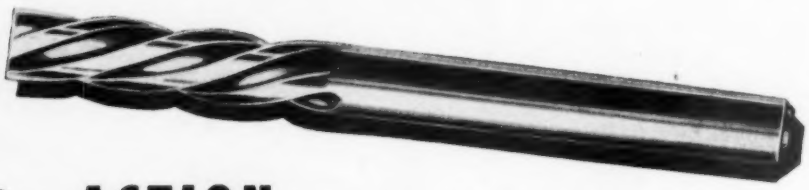
A T R A X

is for ATRAX . . . the finest of cutting tools.

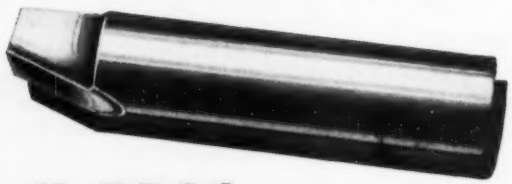
is for TOUGH . . . they're *solid tungsten carbide.*



is for RIGHT . . . they're precision ground-from-the-solid.



is for ACTION . . . when Atrax tools solve difficulties in your production line.



is for X-TRAS . . . Atrax tools give with longer service, less trouble, better profits.

Representatives and Distributors in principal cities in United States and Canada. Write for name of representative in your area.

Send for complete catalog NOW!

THE ATRAX COMPANY

NEWINGTON 11, CONNECTICUT

High Speed

ROCCO

Horizontal Boring Mill

ROCCO TYPE AL-76 3" SPINDLE HORIZONTAL BORING MILL. #5MT spindle. Rotary table 39" x 29". Table travel Longitudinal 40¾, 53" without column; Cross 30". Maximum distance spindle to table 31½". 24" spindle traverse. 16 spindle speeds 13-850 R.P.M. 18 feeds .0006"-.157" 8 H.P. drive. Equipped with measuring rods and dial indicators graduated in .001".

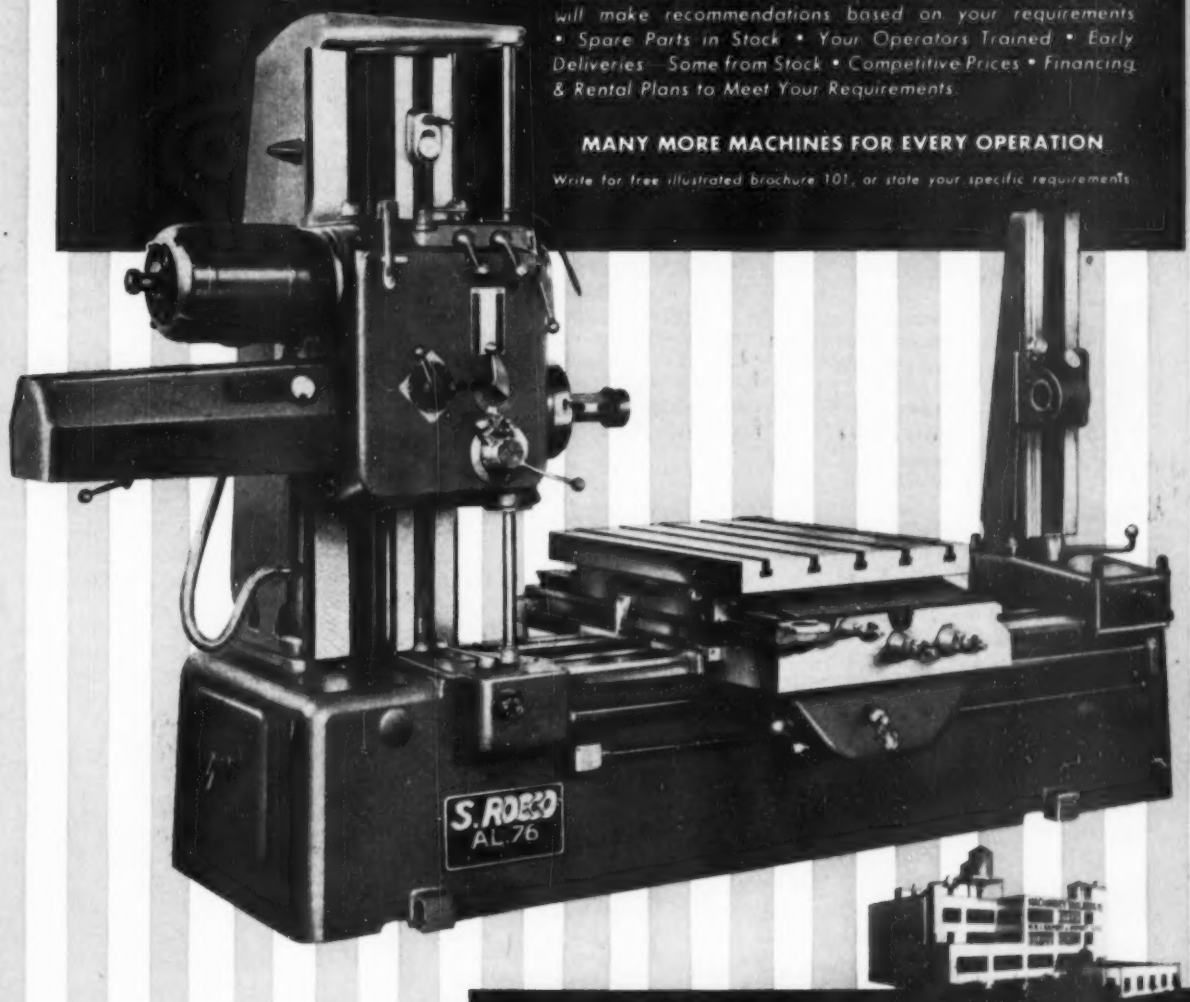
OUTSTANDING FEATURES

All lead screws in inches, All dials in thousandths, Timken precision spindle preloaded roller bearings; Hardened gears; Spindle high quality alloy steel nitrided and ground

• Guaranteed Service by Trained Staff • Engineering Staff will make recommendations based on your requirements • Spare Parts in Stock • Your Operators Trained • Early Deliveries Some from Stock • Competitive Prices • Financing & Rental Plans to Meet Your Requirements

MANY MORE MACHINES FOR EVERY OPERATION

Write for free illustrated brochure 101, or state your specific requirements



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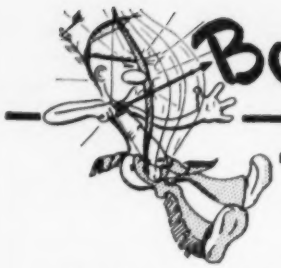


Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

Upside Down Tools

I was interested in the letter by A. T. Renson (*AM*—Mar. 2, '53, p 81) on upside-down cutting-off tools. I found the same practice in Japan nearly 25 years ago, not only for cutting off, but also for turning. There, however, they had the tools on the back side of the work so it turned in the regular manner. They had the same reason—holding the spindle down in the lower bearing. It also has the advantage, where the work is held in a chuck, of not tending to loosen the chuck on the spindle nose.

I have also seen lathes run backward, with the cutting tool at the back, for no apparent reason, as this tends to loosen the chuck on the spindle. Upside-down tools do help to get the chips out of the way.

Fred H. Colvin
Point Pleasant, N. J.

For Rent

We are gratified to note the featuring of our X-ray equipment in Mr Anspach's article on Non-Destructive Testing (*AM*—Mar 2 '53, p117). This was an excellent and informative article, and stressed the proper aspects of the need for non-destructive testing equipment in industry.

I hate to mar a compliment with a criticism, but I must also mention that Mr Anspach is in error when he states (p124) that X-ray equipment cannot be rented. (He evidently has not been reading *AM*).

We are at present the only X-ray equipment manufacturer offering equipment on a rental basis—have been doing so for 2½ years, in both industry and medicine. It is known as our Maxiservice plan, on which you carried the original announcement in August 1950.

David Goodman
General Electric Co
Milwaukee

Watch the Birdie

Some time ago I read (*AM*—Oct 27 '52, p 157) that a machine-tool manufacturer has been using a Stereo-Realist camera and Realist slides in selling machine tools. We have been using one of these cameras in our shop for almost two years for another but, we think, equally useful and important purpose.

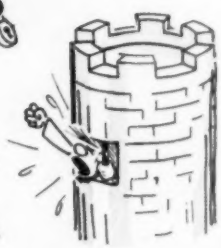
We photograph various setups, such as tooling on the turret lathe for some particular item, drilling or

GRINETICS

BY D G SMITH

HEADSTOCK

CERTIFICATE OF NECESSITY



CASTELLATED

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FOR PRECISION

PLUS PRODUCTION . . .

PRECIS-O-NIZING

OLD mass production methods are not enough to satisfy a market that is demanding both *quality* and *lower prices*.

Only through modern precision-production techniques can a manufacturer hope to use this two-edged sword to his own advantage!

Because of this need for a productive method of generating precision . . . the Microhoning process was evolved. For a quarter of a century the Micromatic Hone Corporation, working with industry, has led the honing field in the development of equipment that would productively finish parts within the ever-shrinking tolerances of new designs and standards.

This applied precision-adeptness of the Microhoning process is "PRECIS-O-NIZING".

In one economical operation Microhoning abrades stock rapidly and efficiently with a minimum of heat to generate—

—bores that are round and straight
—accurate diametric size
—a functional characterized (cross-hatch pattern) surface finish that is free of smeared or distorted material.

The processing of sewing machine parts is an example of PRECIS-O-NIZING.

Shown are typical industrial sewing machine parts that are Microhoned. Total tolerances for size, roundness and straightness is held to .0003 inches, or less.

The shaft bushings (needle, presser, eccentric, hook . . .) are specific applications of functional Microhoning.

The characterized cross-hatch pattern and the precision of Microhoning enable these rotating and reciprocating bushings to retain minute reservoirs of lubricating oil. At the same time, they maintain such precise fit with their shafts that a working seal is formed and there is no leakage of oil.

Similar parts are interchangeability selective fitting of components is no longer necessary.

Microhoning equipment is available to handle all kinds and sizes of parts . . . from soft non-ferrous metals to hardened steel and special alloys . . . from .078 to 60 inches in diameter and from ¼ inches to 75 feet in length.

MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH

PRECISION PRODUCTS — MICRO MATIC — TRADE MARK

MICROMATIC HONE CORPORATION • 8100 Schoolcraft, Detroit 4, Michigan

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MICRO-MOLD MFG. DIV.
Boston Post Road
Guilford, Connecticut

MICROMATIC HONE CORP.
614 Empire Building
206 So. Main Street
Rockford, Illinois

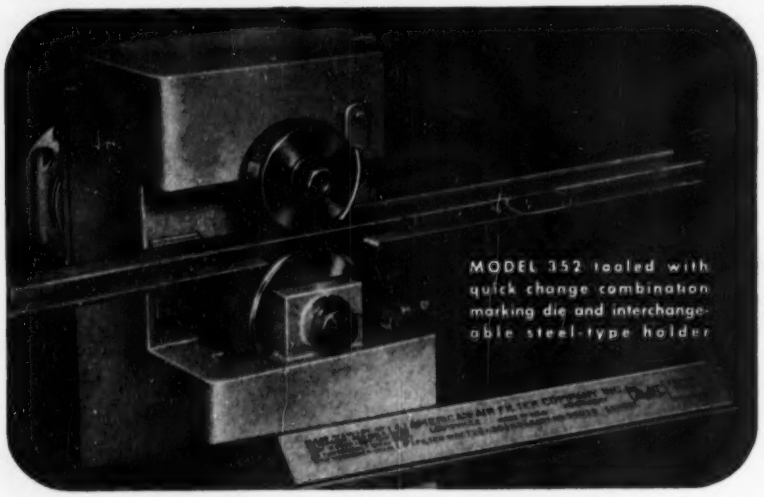
MICROMATIC HONE LTD.
330 Grand River Avenue
Brantford, Ontario, Canada

MICROMATIC HONE CORP.
1535 Grande Vista
Los Angeles 23, California

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
231 So. Pendleton Avenue
Pendleton, Indiana

REPRESENTATIVES: Overgard Machine Tool Company, 234 Commonwealth Bldg., Denver 2, Colorado
Hallidie Machinery Co., 2726 First Ave., South Seattle, Wash. • REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

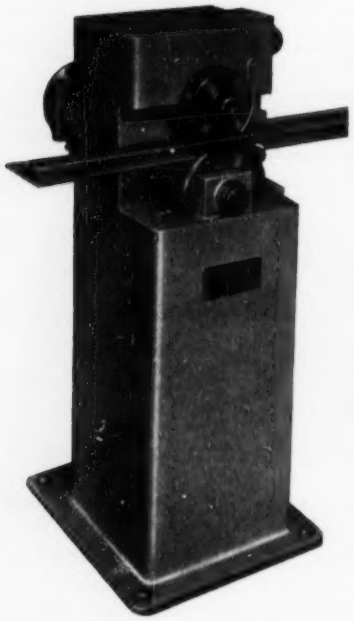
LEADERS IN INDUSTRY MARK WITH NOBLEWEST



NEW - IMPROVED

NOBLEWEST BAR AND STRIP STOCK MARKER

provides better, faster marking . . . at lower cost!

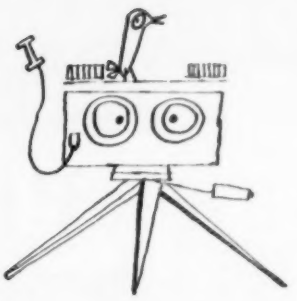


This Noblewest rapid production marking machine was developed especially for marking bar and strip stock, and other long, flat parts of metal, plastic, hard rubber or wood with the manufacturer's name, trademark, part number or other inscriptions.

This machine employs the *roll-marking* process originated by Noblewest to produce sharp, *permanent* impressions that will last as long as the product itself.

Noblewest is equally famed for fine marking dies. They are made of the very finest steel and to the most exacting standards of quality . . . yet, they are competitively priced.

For complete details on Noblewest Marking Machines, tools and dies, write Noble & Westbrook Mfg. Co., 17 Westbrook St., East Hartford 8, Connecticut.



tapping setups, milling setups, and the like. These three-dimension slides show in detail exactly how the setup was arranged, how the air hose and nozzle were installed, what bolt holes were used on the table, which T-slot, and a lot of other details too numerous to mention.

When a setup has to be duplicated after a lapse of six months, it saves a great deal of time to be able to look up a good three-dimension shot of the previous setup. We keep a slide file and an index, the slides are dated and labeled with the job, and it is a matter of only a few seconds to check on the previous setup. This is a great help on the turret lathe particularly. It shows the sequence of the tools in the different stations and saves a lot of mental wear and tear in a day's work. When we make an improvement in a setup, we photograph it again, and date and file the slide.

L E Wilson
Cashmere, Wash.

Life Is Too Short

In Talking Shop (*AM*—Oct. 27 '52, p 157) it says that GE now has an instrument that will show up a leak so small that it would take 10,000 years to empty a pint bottle. Heeeee, what a long suck! Now a few of us know how long it usually takes to empty a pint bottle. How is a poor guy to live long enough to make a showing? Or, being more practical,

and assuming no loss by evaporation or government "take" by way of inheritance tax, how many generations would it take to reach the bottom of the bottle?

One can readily see the possibility of thoughts engendered by conscientious study of your illustrious pages, even though those thoughts are unproductive of immediate benefit. There is a possibility, however, of striking paydirt one of these days, and then—Whoopee!

John Homewood
Ontario, Calif.

This reminds us of when people were working themselves into a frenzy over Fulton's steamboat—but Fulton was generous enough to provide them with rides when the engine was proven. Perhaps GE is equally generous with the leak detector where there are pint bottles filled with radioactive gas.—ED.

Copy Cats

The Russian optical profile grinder (*AM*—Mar 2 '53) p 106) looks like a Wickman grinder which is made in this country by Sheffield Corp. The optical system with the translucent screen looks similar to an experimental setup I saw at the Sheffield plant about 16 months ago. They were using an Eastman Kodak projector built into the machine with the same general layout as shown in your photo, and were experimenting with various remote controls for moving the two cross-slides, including hydraulic actuators and selsyn motors. All this experimental work has been stimulated by the superb Cincinnati form grinder with an integral optical-projection comparator system .

C F Schmarje
Schmarje Tool & Eng Co
Muscatine, Iowa

We agree with reader Schmarje that there is a distinct similarity. This leads to the conclusion that they are "inventing" a lot of new equipment by combining the best features of well-known machines.—ED.

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For maximum cutter-grinding efficiency in your toolroom, check these three important points:

EASE OF OPERATION. The Oliver Ace is easy on the operator and engineered to handle a wide range of cutter grinding. Requiring no computation—direct reading for clearance reduces fatigue, eases operators' jobs (no stoop . . . no squat . . . no squint). Only two simple fixtures required for a general range of cutters.

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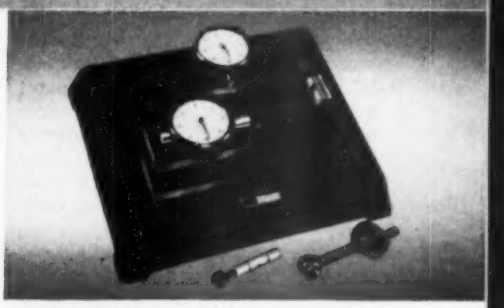
Photo shows Gages for use at production and at final inspection. All these Gages were engineered directly from customer's Process Sheets and were designed from the sample parts shown and from blueprints. Each Gage checks a different dimension and is shown with its *single* master (*not two*).



ALIGNMENT of TWO HOLES in compressor connecting rod is checked to a high degree of accuracy. Model 256 B-37.

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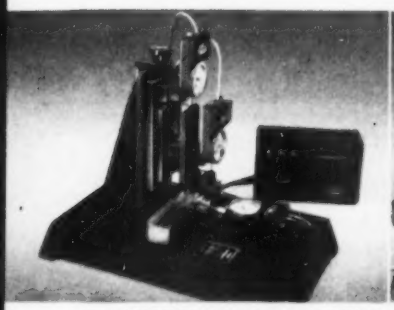
At Federal we know the basic difference between designing and building precision gages and designing other mechanical products.

Designing machines, fixtures and tools involves holding workpieces in position by *force* – transferring and transforming *power* to act as wanted – counteracting *heavy* stresses and strains.

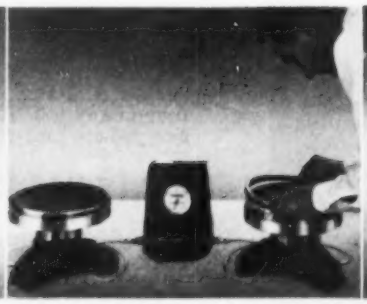
Designing precision gages, however, requires knowledge of how to *magnify* and *transfer* measurement variations *precisely*, without *loss* of motion – with a minimum of *friction* and *inertia* in the working parts – and a hundred other details which do not concern the usual tool and machine designer.

Use Federal's highly specialized experience and obtain the benefit of our extensive know-how and skill. No matter whether it's an Air or Automatic Gage or a Dial Indicator type, there is every reason you should get better gages if Federal designs and builds them. Call in Federal when you *start* processing a job and let us engineer your gages for you. Federal Products Corp., 1124 Eddy Street, Providence 1, Rhode Island.

A FEW OF THOUSANDS OF INDIVIDUAL GAGES ENGINEERED BY FEDERAL

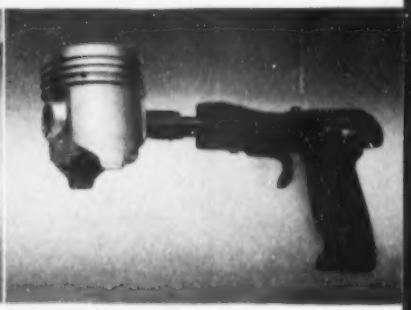


THICKNESS, WIDTH and TAPER are checked simultaneously. Tolerance lights show if a dimension is incorrect. Model 325 B-57.



AVERAGE INSIDE DIAMETER of thin rings checked with 6-*jet* Air Gage. Special Guide Sleeve makes rings slip on gage easily. Model APH-S-9.

SPACING between blades of turbine is checked at two points. Model 294 P-167.



DISTANCE between retaining ring grooves in wrist pin holes of piston checked for accuracy. Model 444 P-226.

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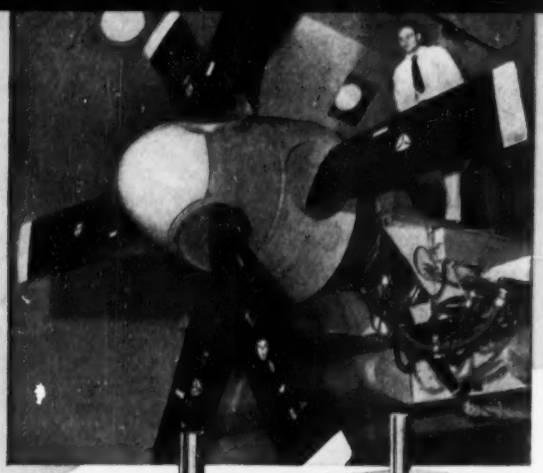
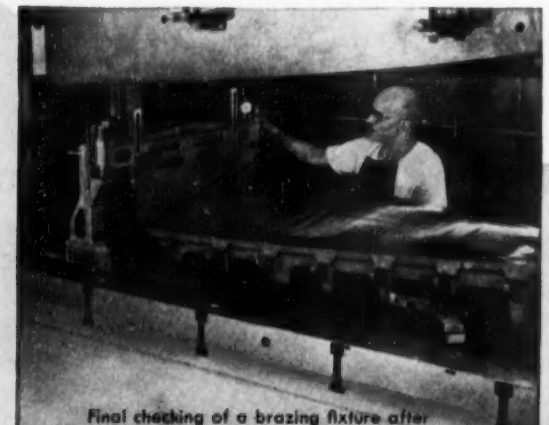


High speed aircraft propeller on test stand—built from tools "spotted in" to a DANLY SPECIAL DIE SET.

DANLY SPECIAL DIE SET, 46 by 140 inches, used for both production and checking of aircraft propeller tools.

DANLY SPECIAL DIE SETS



Final checking of a brazing fixture after "spotting in" to the master. A bridge gage is used with a series of templates as shown.

DEPENDABLE FOR ACCURACY

Here's proof . . . this Danly Special Die Set is used by one of the country's leading aircraft propeller manufacturers for "spotting in" all contour tools for a complete production line. Accuracy is a must because the tools, masters for duplicating planers and profilers as well as holding fixtures, must mate closely with the master pattern and with each other in the sequence of operations.

Dependable accuracy makes Danly Special Die Sets ideal for applications of this kind . . . and rugged construction makes them last longer, too, on any job. That's why leading diemakers everywhere prefer Danly Die Sets!

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DIE SETS AND DIEMAKERS' SUPPLIES

SPOT NEWS of Metalworking

- **Shortage of plastic mold makers is jeopardizing tooling plans.** For every 25 jobs available, there are said to be only five men. Delivery time: 30 weeks. Add to this the lead time for forging mold steel, design time, etc, and it takes a year. For instance—an appliance maker has a hot idea for a television cabinet. By the time it's ready for production a year later, the design is obsolete. Needed: more mold makers (lead men get a basic $4 per hr rate, work 60 or more hrs per week).

No real conflict exists between the Wilson Plan (narrow the base of defense contractors) and the Vance Plan (standby defense production lines), according to Harold S Vance, chairman of the Production Equipment (Vance) Committee. As cutbacks become possible and the number of contractors is reduced, he says, the Vance Plan for standby facilities comes into being.

- **Solderless metal-to-metal connections that will withstand a 10-lb pull** are now possible with a trigger-actuated, hand-held gun that spins skinned end of a connecting wire around a terminal to produce a gas-tight joint. Now being licensed to manufacturers by Western Electric Co, the unit opens avenues of automation for communications equipment assembly.

- **Defense Dept is pondering this problem on cutbacks:** if an additional contractor can make a major item cheaper than the prime contractor who developed it, shall the Defense Dept (1) cut off the prime contractor and lose the chance for product improvement (2) or cut off the additional contractor and, if so, how can the cut-off be explained to Congress?

- **England is considering duty-free entry of machinery,** according to Peter Thorneycroft, president of the United Kingdom Board of Trade, who has set up a committee to review its pros and cons.

- **Lion's share of '53 Studebaker output will be in sports cars,** says President Harold S Vance. Originally, Studebaker planned to produce 60% conventional models, 40% sports cars, itself a radical change from previous years. But sports car demand has so exceeded expectations, the company has reversed the percentages—60% sports cars, 40% conventional. One reason for the switchover: even staid matrons can't resist Stude's continental styling.

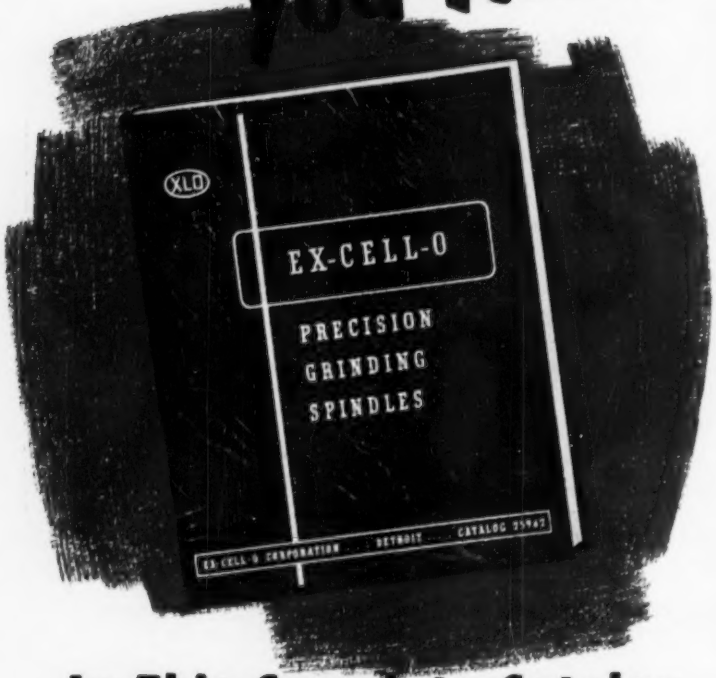
- **US buyers can get good deliveries** on practically any type of machine tool today, according to Tell Berna, General manager of the National Machine Tool Builders' Assn., at the Westinghouse Machine Tool Electrification Forum. Average machine tool backlog: 9 months.

A new defense plan would put fighters and missiles at the head of the priority list and relegate the Strategic Air Command to a secondary role. Plan has the backing of Defense Secretary Wilson, Deputy Secretary Kyes and Air Secretary Talbott. It could mean bigger contracting for smaller planes and missile , but even so, the day of the big bomber is passing.

- **Converting atomic energy to peacetime applications** is the objective of the non-profit Atomic Industrial Forum, recently set up in New York. Aims are fourfold: (1) to foster development and use of atomic energy for civilian use: accent on free enterprise; (2) to provide a forum where individuals and corporations can discuss problems, (3) to promote knowledge relating to development of atomic energy, inasfar as is consistent with national security, and (4) to foster and encourage research.

- **Important savings are being made in mass-production plants** by switching to cold heading and cold forming of steel and other metals. In one header job, annual savings amount to 3½ times cost of the equipment. In a press-formed product, tonnage of steel saved is worth more than the press itself.

The Spindle You Want



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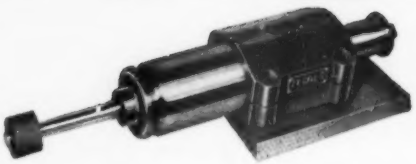
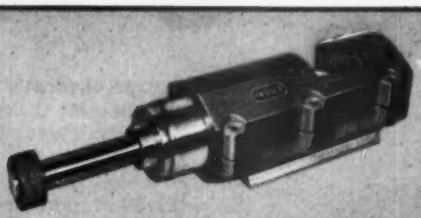
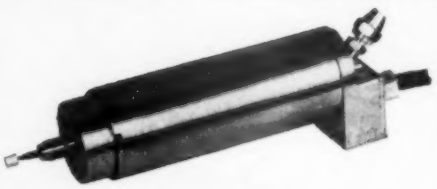
● Leading grinder manufacturers install Ex-Cell-O Precision Spindles as original equipment. You can improve the performance of your grinders with Ex-Cell-O Precision Spindles. They are rigid and smooth-running, permit heavy cuts without chatter, require no lubrication or adjustment. All are fitted with precision ball bearings manufactured by Ex-Cell-O.



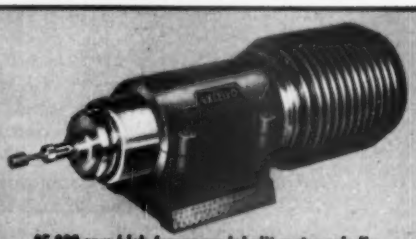
Single-body, belt-driven internal grinding spindle.



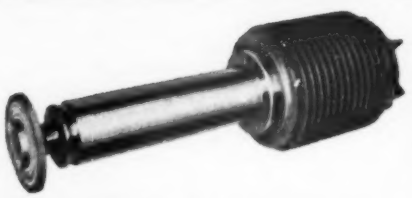
Double-body, belt-driven internal grinding spindle.



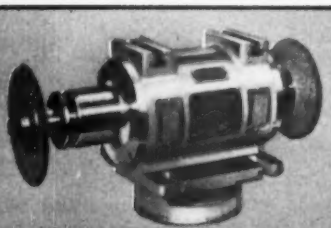
65,000 rpm high frequency inbuilt motor spindle.



25,000 rpm high frequency inbuilt motor spindle.

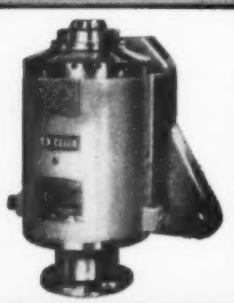


Totally enclosed inbuilt motor surface grinder spindle.



Precision inbuilt motor spindle for cutter grinder.

Vertical precision spindle with inbuilt motor.



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Washington

Don't look for early settlement of the "Broad Base" question. Defense Secretary Wilson is inspecting US and NATO bases in Europe until mid-May and won't be able to explain his ideas to the Senate Armed Services Committee until he returns. In the meantime, he's hoping that the storm of protest about his plans to reduce defense contractors will blow over.

Indications are that Wilson is backing down. He told Senator Saltonstall, Armed Services Committee chairman, that when he gets a chance to explain his views, he will show there is no basic conflict of ideas.

One thing was evident by the Wilson statement: he was having a hard time meeting the defense share of Republican budget cutting—about $4.5 billion for fiscal 1954. Reports are that all Wilson has been able to cut from next year's spending is about $3 billion. So, if the administration hopes to approach a balanced budget next year, the White House will have to slap on a spending ceiling of about $42 billion—about the same as this year's spending figure.

• • •

President Eisenhower has asked Congress to create a permanent Office of Defense Mobilization to replace the temporary agency that now exists.

The new agency's function will be twofold: On the planning level, it will do the ivory-tower thinking on industrial mobilization; on the operating level, it will be the top-echelon agency on such defense jobs as priorities, allocations, economic controls, expansion of facilities, and stockpiling.

In his reorganization plan for ODM, the President recommended abolishment of the NSRB and assumption of its duties by the new agency. He also called for transfer of the Munitions Board's stockpile-planning function to ODM.

• • •

This is a prelude to an anticipated Presidential reorganization plan that would abolish the Munitions Board and create a new Assistant Defense Secretary to direct defense procurement and handle other non-stockpile functions.

Defense Secretary Wilson and his predecessor, Robert Lovett, both have labeled the Munitions Board an ineffectual agency. The new Assistant Defense Secretary would have authority lacked by the board chairman: power to enforce procurement decisions on the services who do the actual purchasing.

The President's ODM reorganization scheme did not spell out the new agency's makeup. But it's speculated that ODM will consist of four major units: stockpiling, mobilization planning, economic stabilization, and production. Personnel will number about 325, 200 less than before.

Arthur S Fleming, who has been Acting Director of the temporary ODM, has been named to head the new bureau. He's been an ODM official since February 1951. Before that he was Republican member of the Civil Service Commission, on the War Manpower Commission, and the Hoover Commission. He is also a prominent college educator.

• • •

John J Prendergast, Chief of ODM's Production Division, is expected to stay on as the government's top-level operating official for industrial production, coordinating output of machine tools, electronics, aircraft, and other essential hard goods.

• • •

The long-smoldering tariff controversy is about to flame up. The President has called for a one-year extension of the reciprocal trade act as it is in its present form.

Extension of the Trade Act will do two things: generally, it will leave tariffs about where they are now for another year—and it also guarantees another year of jockeying and in-fighting for a final decision.

• • •

All along, Eisenhower has been counted as an internationalist. But now the Free Traders are beginning to wonder about him. Their major worry: Eisenhower apparently is taking a back seat on tariffs and has clearly left the issue up to Congress.

For one thing, he has privately assured Congressional leaders he won't try to negotiate any new tariff reductions, as the law now permits him to do. For another, he's leaving it up to Senate Leader Taft and House Leader Martin to get a simple extension through Congress.

To top it off, two recent Eisenhower appointees—Talbot as Tariff Commissioner, Wormser as Assistant Interior Secretary—are out-and-out protectionists.

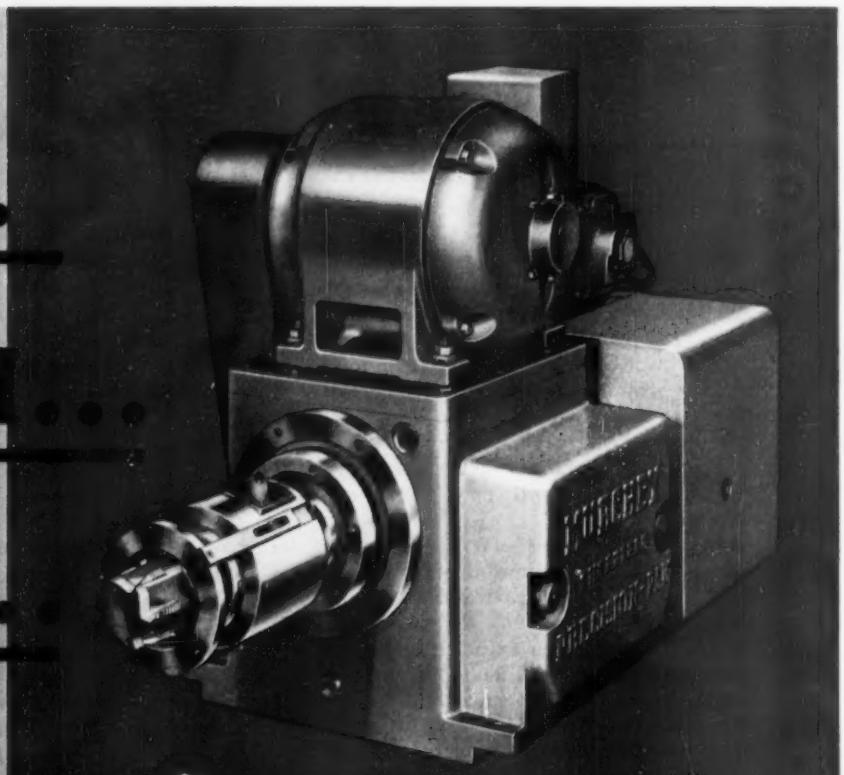
• • •

The battle over new tariff legislation goes on almost independently of any general understanding as to what the present US import restrictions really are. One side generally figures that whatever they are, they can't be safely lowered; the other feels that our only salvation depends on increasing US imports from our allies.

• • •

Current defense expenditures, as of May 1, amount to about $36.5 billion, averaging out to around $3.5 billion per month for the fiscal year. This brings total expenditures since Korea to $98.5 billion. Defense contracts for the period totaled $108 billion.

Tap . . .
Thread . . .
Bore . . .
Ream . . .
Automatically



Threading and tapping artillery shells to meet Ordnance specifications or any other high production job can be done AUTOMATICALLY on the new Murchey Precision-Pak—Also boring and reaming when required. Threading is accurately controlled by a precision lead screw, the axis of which coincides with that of the spindle—no intermediate mechanism and consequently no backlash or lost motion—an Exclusive Feature.

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Detroit

Machine tool and specialty machinery companies are getting a shot in the arm with continuing releases on the new Chevrolet engine, destined for production for a couple of years hence. Work on this keeps coming out, and, the job being what it is, volume is very substantial.

These releases are currently being amplified by others from a second source—Packard. Packard is finally letting go the V-8 engine which it has been developing in its engineering laboratory for some time; the releases are coming out slowly but they give evidence of continuing.

On this score it might be noted that a few releases are also out for a new engine line for the Ford tractor.

Between those three programs, there is plenty of business around for a large number of supplier companies. They provide a large share of the answer for the question of last fall—"What is going to take up the slack?"

• • •

Chevrolet automatic transmission facilities are being considerably expanded at Cleveland. Power-glide assembly lines are now working two shifts a day, six days a week; and the expansion of facilities will likely permit somewhat reduced hourly schedules with more personnel. New workers are now being hired and trained.

• • •

Mitchell-Bentley Corp, Ionia, Mich, will fabricate 1954 station wagon bodies for Dodge. Tooling for the job is now going on.

Mitchell-Bentley is an increasingly important factor in this area of autodom. It produces Buick estate wagon bodies, trims and finishes the Kaiser-Frazer Golden Dragon, does the same for the Packard Caribbean, and produces trim for Studebaker and Nash.

• • •

The tooling bill for the 1953 General Motors models, president Harlow Curtice told a California audience in April, was about $300 million. Another Curtice observation: Since the end of World War II GM has now invested more than $2½ billion for new plants, better tools, improved facilities.

Something more significant in this speech: At New York, Curtice in January predicted GM sales volume this year "of approximately $9 billion." At Los Angeles in April he predicted sales volume for 1953 "in excess of $9 billion."

• • •

Automobile production keeps moving up; barring something unforeseen, schedules will result in the highest single quarter in automobile history. Total volume, cars and trucks, U.S. and Canadian combined, has moved above the 175,000-a-week mark.

Incoming sales figures are backing up the industry's optimism. Ward's Reports estimated retail deliveries in March at 500,000. For Wayne County (Detroit), March automobile deliveries were more than 50% ahead of March 1952.

Used car sales, too, were up in Wayne County in just about the same proportion. New trucks were holding their own against last year; used trucks were definitely ahead of the 1952 figures.

• • •

Detroit manpower is getting tighter and tighter. Individual employers are increasing work schedules, hiring part-timers, conducting neighborhood recruiting campaigns, but still haven't enough people. Job vacancies early this spring have been enlarging. Shortages range from highly specialized professional workers to break-in production hands. Manpower officials expect the picture to become tougher before it gets better.

The Detroit area employment rolls probably stood at an all-time peak in mid-April, although the statistics are still not completed.

• • •

Engineers are harder and harder to get. One major company lately advised its divisional managers to provide summer jobs for as many sophomore and junior engineering students in college as possible. "That way" went the letter of instructions, "we may be able to get the inside track on a number of them when they graduate."

Statistics show that at the start of the century about one man in about 250 in industry was an engineer. Today the ratio is one in 50. With payrolls so much higher than they were 50 years ago, you begin to get an idea of the enlarged engineering personnel requirements.

• • •

Having fretted over complications in changing automotive labor contracts to the new BLS price index, Detroit companies are breathing easier. The attitude of the CIO United Auto Workers is much more conciliatory than anyone had expected. Hardly any expectation of major automobile strikes is being heard now.

• • •

The monthly reports filed with the Detroit Purchasing Agents Association showed some interesting trends as of March 31. For example, many more than in February thought business was getting better; many fewer thought it was getting worse. Although commodity prices were generally reported getting higher, buying policy was generally in favor of closer buying —far fewer 6-month commitments; more concentration of commitments in the 3-month-and-under zone.

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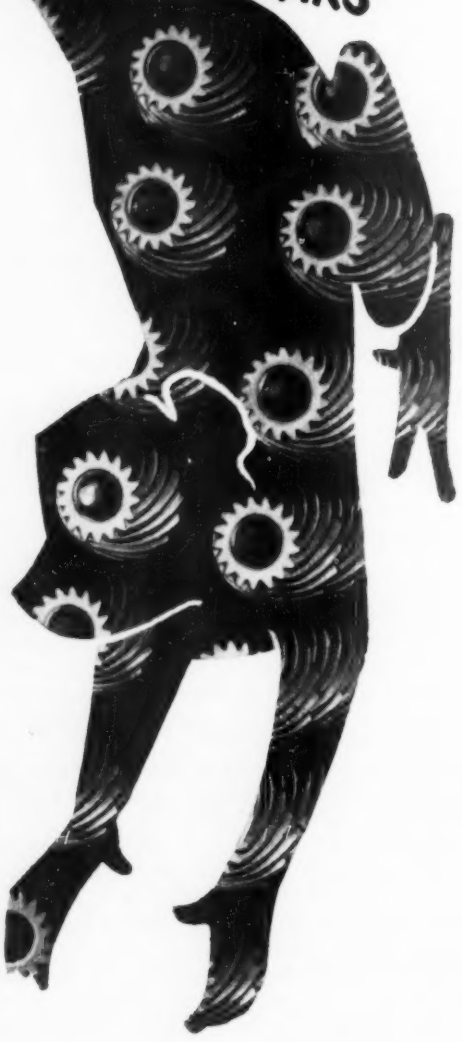

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Machine Tools

Plans are shaping up for NPA's Metalworking Equipment Division after June 30. For one thing, it appears that the division probably will be run by a permanent deputy director who is a full-time government employee.

The director, who may be on the job a day a week or so, still will come from the machine tool industry, will serve without compensation, and will change from time to time.

• • •

While NPA will stay in the Department of Commerce, the Office of Defense Mobilization will have a Production Division. Machine tools will be part of this division's responsibilities..

It will do "coordinating" work on surplus machine tools, pool orders, machine tools for defense.

ODM will be supposed to do the planning for machine tools. NPA will continue to be the doers.

• • •

Just how the backlogs of service-rated orders for machine tools are being eaten into substantially was outlined by Donald M Pattison, former director of NPA's Metalworking Equipment Div at the NMTBA meeting in N. Y.

There were 52,000 such orders in February 1952. A year later they had dropped to about 25,000.

They are likely to be down to 15,000 by July 1. It is only fair to point out, however, that some of these orders are for long lead-time units that will take many months to get.

The most encouraging development is the rise in the pile-up of unrated orders. Early in 1951 they added up to only 10,000 machines. Today, they number more than 20,000 units.

• • •

Imports of machine tools are currently stabilized at $3-$4 million a month, Ralph J Kraut, president of the Giddings & Lewis Machine Tool Co, said at the recent NMTBA spring meeting.

Last year almost $50 million of foreign machines came into the United States. That compared with $13.7 million in 1951, $2.2 million in 1950 and $929,293 in 1947.

Foreign machine tool prices, Mr Kraut said, vary from 40% to 75% of U.S. prices, f.o.b. plant.

Even with the handicaps of duty, transportation, insurance, etc., many foreign machines can be delivered here at less than US. machines.

• • •

Machine tool orders continue to flow freely into builders' offices. Buying is spread out over a wide range of customers, large and small.

But the most spectacular business is coming out of Detroit, where automobile companies are getting ready to expand facilities and to lower costs by modernizing their production equipment. Highly-special equipment is in the forefront of demand.

Many builders catering particularly to automotive requirements, are booked solidly through most or all of 1954. In certain cases, motor car buyers are not asking for deliveries until late 1954.

• • •

A J M Baker, who has been chief of the equipment and methods division of the US Economic Mission to Britain, is leaving his post and returning to this country. He will go into retirement, but will be available for consulting work.

He has been located in the US Embassy in London during most of the time that the British defense production tooling program has been under way. He has visited numerous machine-tool building plants on the Continent, especially in Germany, as well as in America.

• • •

British machine tool builders have booked much more space this year than last at the Canadian International Trade Fair, Toronto, June 1-12.

But this does not represent the full force of British exhibits. This year, Canadian agents will show many British machines that were displayed in 1950 and 1951 by the British themselves.

German machine tool builders dominated the show last year. There will be fewer there this year.

Exhibit space has been taken by builders from France, Sweden and Austria. American builders will be conspicuously absent, only a few having taken space.

• • •

Builders attending the NMTBA meeting at the Waldorf in New York and the distributors' meeting in Cincinnati were generally optimistic. With few exceptions, they have had more business than expected since the year's beginning.

• • •

The Vance Plan appears to be on dead center. Defense Secretary Wilson's program for narrowing the mobilization base essentially involves scuttling the Plan.

No one in Washington knows for sure whether Mr Wilson's program will be accepted by the White House. Pentagon is largely opposed to it and Congressional reaction is far from favorable. Best guess is that eventually it will be killed or drastically modified. Nothing much is likely to happen to the Vance Plan until Mr Wilson's proposal is settled.

• • •

New machine tool orders for March were 335 on the NMTBA Index, according to preliminary estimates. Shipments in March are estimated at 370.9.

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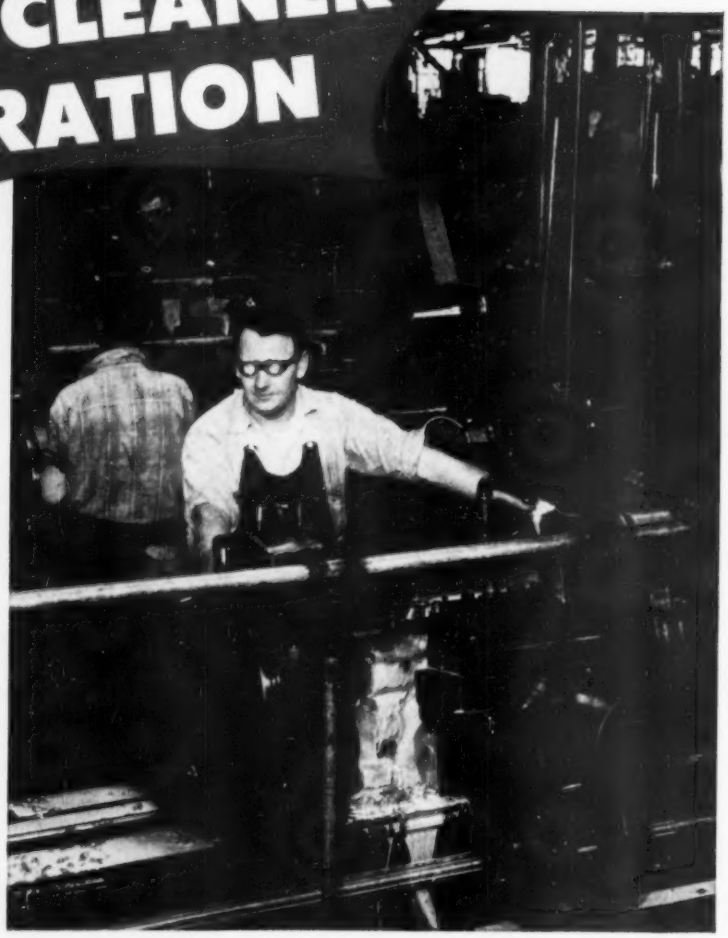

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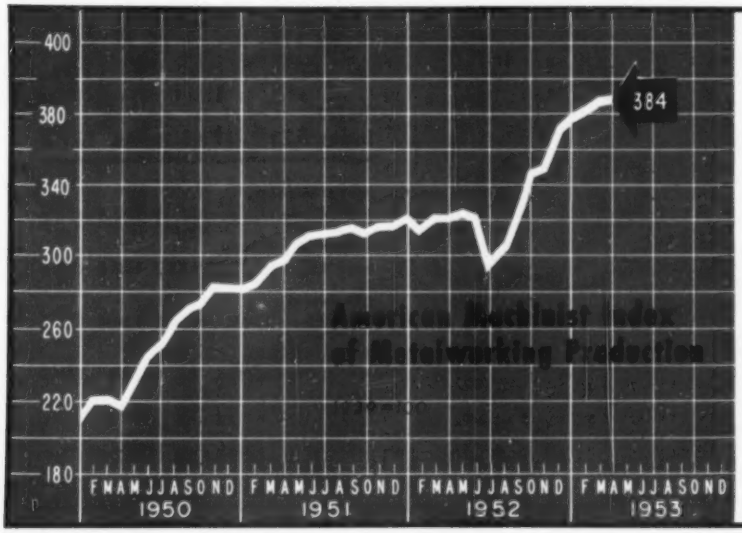
TUNE IN: Tuesday nights on television—the TEXACO STAR THEATER starring MILTON BERLE. See newspaper for time and station.

Gaging Metalworking


400
380
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American Machinist Index of Metalworking Production
F M A M J J A S O N D F M A M J J A S O N D F M A M J J A S O N D F M A M J J A S O N D
1950
1951
1952
1953

PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	APR '53(*)	MAR '53(p)	FEB '53(r)	MAR '52
Tot. Index	**384**	**381**	**375**	**320**
Machinery	**342**	**339**	**322**	
Electrical Machinery	**435**	**431**	**358**	
Autos	**308**	**298**	**214**	
Other Transportation	**603**	**594**	**512**	
Other Metalworking	**376**	**372**	**314**	

(*) Estimated (p) preliminary (r) revised

Metalworking output keeps heading towards the 400 mark (1939=100), with the American Machinist index of metalworking production estimated at 384 for April.

This is a gain of 3 points over the March figure, which itself represented a gain of 4 points over the February index.

• • •

Industrial-machinery output is running 8% ahead of a year ago. Spending on capital equipment indicates a high output of machinery for some time to come.

• • •

Electrical machinery output is topping last year's total by about 20%. Heavy electrical apparatus and consumer appliances are still running at near-peak production.

• • •

Auto production is nearly half again as much as it was in early spring of 1952. Parts manufacturers are still working at top speed to keep up with the assembly lines.

How long the auto industry can keep it up is questionable. Sales efforts in this field will be doubled before long.

Other transportation equipment (ships, railroads, aircraft) is currently running about 20% ahead of a year ago, with aircraft production close to planned peak rate.

But cutbacks in defense production will probably have some influence on future plane rates.

• • •

First effects of current defense cutbacks were felt by makers of J-47 jet engines, who had $100 million lopped off their backlogs recently.

New orders for machinery are holding up extremely well. High-level operation for the machinery industry is in view for the next six months.

• • •

Exports of machinery and vehicles declined between January and February. This dip, from $456.6 million to $421.8 million, primarily reflects declines in export shipments of machine tools, mining machinery, and construction equipment.

• • •

TV production may top 10 million sets this year, if the current upward sales trend keeps up. February output ran about 80% ahead of a year ago.

Other appliance lines are also doing well, with the possible exception of a slight drop in refrigerator demand.

• • •

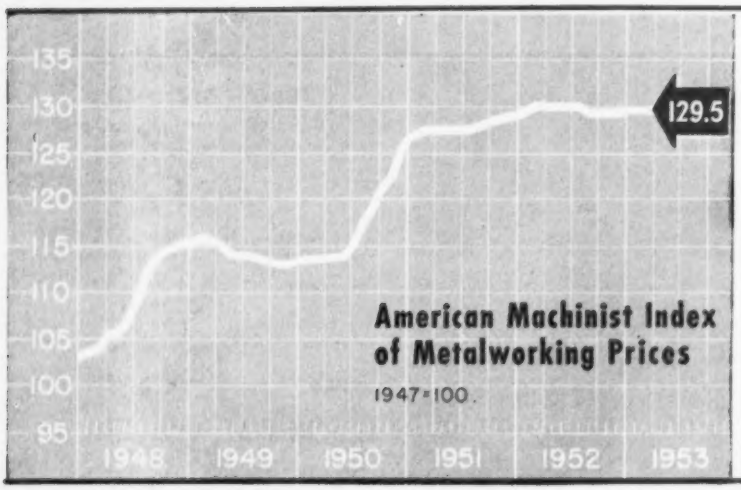
Steel production is moving still closer to its first 10-million-ton month. March output totaled 9,478,000 tons of ingots and steel for castings in the first 29 days of the month.

Last week in March topped all previous weekly records with an output of 2,324,000 tons.

Steelmaking furnaces were operating at an average of 103.1% of capacity.

New steel production records were set week by week all through the months of March. Week of March 2 averaged 100.3% of capacity; week of March 9, 101.3%; and week of March 16, 101.5%.

Gaging Business



PRICE INDEX

	APR '53(*)	MAR '52(p)	FEB '52(r)	MAR '52
Total Index	**129.5**	**129.5**	**129.8**	**129.8**
Metalworking Machinery	**137.9**	**187.8**	**136.6**	
Other Machinery exc. Electrical	**132.7**	**132.5**	**132.5**	
Electrical Machinery	**124.6**	**124.6**	**126.5**	
Fabricated Metal Products	**127.6**	**128.3**	**128.1**	

(*) Estimated (p) preliminary (r) revised

Consumers are spending at an unprecedented rate —for durables, non-durables, services—but the spending increase has surpasseed gains in consumer income.

The result: net personal savings dropped $1.5 billion from the fourth quarter 1952 to the first quarter 1953.

Savings rate declined from 8.5% of income after taxes to 7.8% in the same period.

• • •

February personal income stayed level with January's—at $280.5 billion.

Manufacturers' payrolls were up a little—a gain offset by the seasonal decline in farm income.

• • •

Sales of all business (44.9 billion) in March ran 5.6% higher than a year ago, with the seasonally adjusted February total up 3.5% above January's.

February manufacturers' sales topped January by $1 billion. The breakdown: durables, $700 million; non-durables $250 million.

Manufacturers' inventories for February were up $100 million over January, retailers' stocks topped January by $200 million, and wholesalers' inventories were $60 million higher.

• • •

Auto installment credit rose $145 million during February. Amount now outstanding on auto credit is 5.4 billion—$1.5 higher at February's end than a year ago.

Payments, however, are lagging. Last year, the total of monthly payment loans past due for 30 days or more was about 3% of total amount outstanding. Since the start of 1953, the rate has jumped to 9%.

• • •

A wave of strikes is upon us. Number of new walkouts increased to 20 or 30 per day in recent weeks, compared with 4 to 12 in an earlier period. Trend is seasonal. Labor contracts come up for renewal in April, May, and June.

WEEKLY BUSINESS INDICATORS

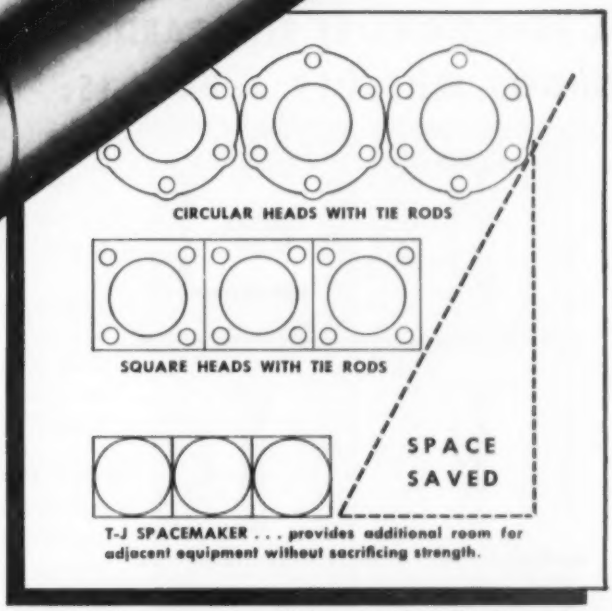
	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-25 = 100)*	258.3	257.7	230.1
Steel ingot production (thousand tons)	2,180	2,230	2,038
Electric power output (million Kilowatt hours)	8,001	8,019	7,154
Production of automobiles and trucks	175,522	170,567	123,180
Engineering construction awards (*Eng. News-Record*, millions)	$275.0	$195.1	$235.1

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	378	347	278
Vacuum cleaners sales (thousands of units)	246	256	236
Washers sales (thousands of units)	327	277	256
Household electric ranges sales (thousands of units)	114	109	65
Radio production (thousands of units)	1,192	1,093	737
Television production (thousands of units)	731	719	409
Gear sales index (1935-1939 = 100)	688.9	590.8	539.5
Foundry equipment new orders index (shipments, 1937-1939 = 100)	257.3	301.0	200.4

* Seasonally adjusted

NEW T-J Spacemaker AIR CYLINDERS



T-J SPACEMAKER . . . provides additional room for adjacent equipment without sacrificing strength.

- SAVES UP TO 40% SPACE WITH NEW STREAMLINED DESIGN.
- SUPER STRENGTH . . . EXTRA HIGH SAFETY FACTOR
- SOLID STEEL HEADS
- HEAVY WALL, PRECISION HONED, HARD CHROME PLATED, SEAMLESS STEEL BODY
- LEAKPROOF CYLINDER HEAD TO BODY CONSTRUCTION.
- RELATIVE PORT POSITIONS MAY BE ROTATED WITHOUT DISASSEMBLY OF CYLINDER AND LOCKED IN DESIRED POSITION.
- HEAVY DUTY, HI-TENSILE, HARD CHROME PLATED PISTON ROD.

Streamlined construction of the new T-J Cylinders *eliminates tie rods . . . reduces head size . . .* and *saves up to 40% in mounting space!* In addition, a new high in strength is achieved with solid steel heads and heavy wall seamless steel body . . . leakproof construction . . . extra high safety factor.

Cylinder walls are precision honed and hard chrome plated for long-life efficiency. Available with the new T-J Super Cushion Flexible Seals which insure positive cushion with automatic valve action for fast return stroke. Many standard sizes and styles . . . both cushioned and non-cushioned . . . for wide range of pushing, pulling, lifting, clamping or control jobs. T-J dependability. *Fast delivery* to meet rush requirements. Write for bulletin 8152. The Tomkins-Johnson Co., Jackson, Mich.

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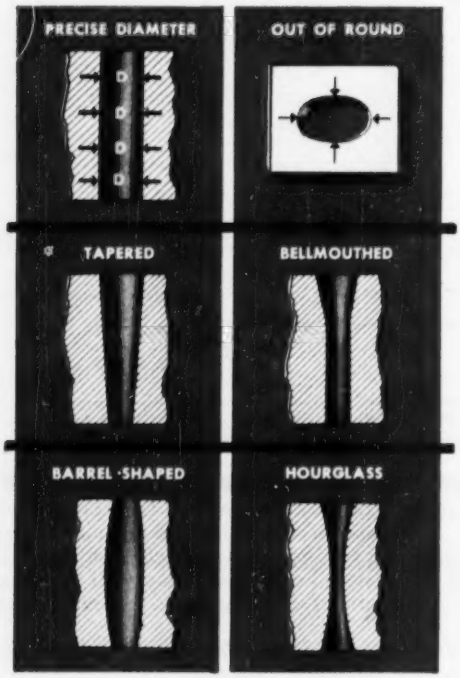
A PRECISIONAIRE STANDARD SPINDLE SHOWS WHETHER A HOLE IS:



A Precisionaire and *standard* spindle shows you instantly whether a hole is dimensionally O.K.—and, if not, *what* the error is, *where* it is, and *how* much.

Precisionaire spindles prevent accepting bad parts in Receiving Inspection. In Production Inspection they show when and how to adjust a machine *before* scrap is produced. They prevent passing incorrect parts in Final Inspection.

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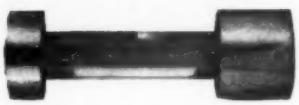

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Get the Vance Plan Off Dead Center

So Secretary Wilson wants to narrow the defense production base rather than broaden it! That's a strange way of protecting our future national security.

Perhaps Mr Wilson has forgotten the elementary fact that sheer manufacturing efficiency should not necessarily be the prime purpose in setting up armament-producing facilities.

How can he gloss over the imperative need in wartime, and preferably in advance of war, for a multiplicity of sources for planes and tanks and guns and communications equipment?

Nations learned in World War II, through agonizing experience, the inestimable value of plant dispersal. Remember how Germany foolishly concentrated its output of bearings and thereby made easy our job of crippling and then paralyzing that output? We do not want to risk that kind of thing happening here.

FOR OUR SAFETY'S sake, Mr Wilson's predecessors subscribed to the sensible principle of broadening our mobilization base within reason. The more manufacturers with munitions-production know-how, the better.

We entered World War II with a deplorable and dangerous lack of knowledge of armament making. Fortunately we had time then to get going. Let's remember, however, that it took us almost two years to attain peak production.

The swiftness with which events promise to move in any future war, in this atomic age, would allow us no such time as we had in 1941-1945. We must be tooled up and ready to plunge quickly into manufacture of weapons of the latest design — whenever and if ever an emergency should arise.

That inescapable fact is what lends strength to the plan of the Vance Committee for tooling up standby defense plants, a plan that Mr Wilson seems bent on pigeonholing permanently.

THESE PLANTS might be operated on a pilot-line basis. In any event, they would be kept up-to-date. The tooling would be changed from time to time to conform to changes in the design of armament.

Such tooled-up factories, ready to go in an emergency, would insure production of the latest weapons with the shortest time lag. They would make unnecessary the manufacture and stockpiling of thousands of tanks and planes and guns at a cost of tens of billions of taxpayers' dollars.

These weapons soon would become obsolete and would rust from disuse. Yet Mr Wilson champions such stockpiling of weapons and would produce them in a relatively few large factories. Manufacturing know-how would be closely held in a small select circle, instead of being widely disseminated in keeping with the commonsense principles of national safety.

Mr Wilson's pet idea — dual-purpose plants — is no substitute for the Vance plan. It is commendable, as far as it goes. It has a certain kinship with the standby-plant program of the Vance committee.

But the fact that it can have only limited application hardly commends it as a worthy and satisfactory substitute for the much broader program conceived by Mr Vance and his distinguished committee associates.

The Vance plan, now on dead center, is a practical means of achieving maximum protection with a minimum drain upon taxpayers and upon our economy generally. Broadening of the mobilization base is at the heart of the plan.

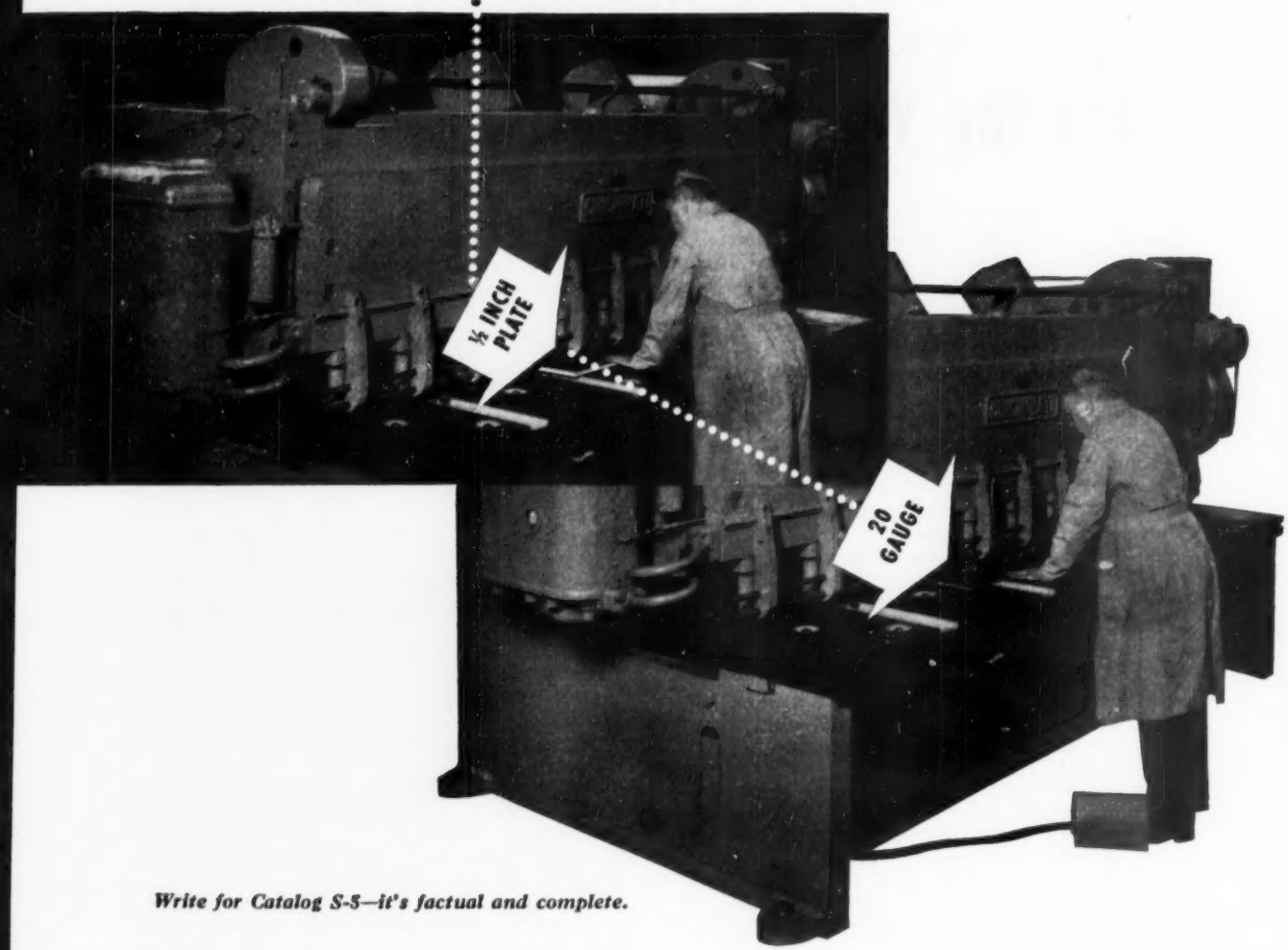
MR WILSON'S unsound and politically untenable views on narrowing rather than broadening the base should not prevail. Instead, the Vance plan deserves the wholehearted support of Congress and of the Administration.

Burnham Finney

SHEAR ½" PLATE OR 20 GAUGE SHEETS

without changing knife clearance

ON A CINCINNATI . . .



Write for Catalog S-8—it's factual and complete.

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CINCINNATI 25, OHIO U.S.A.

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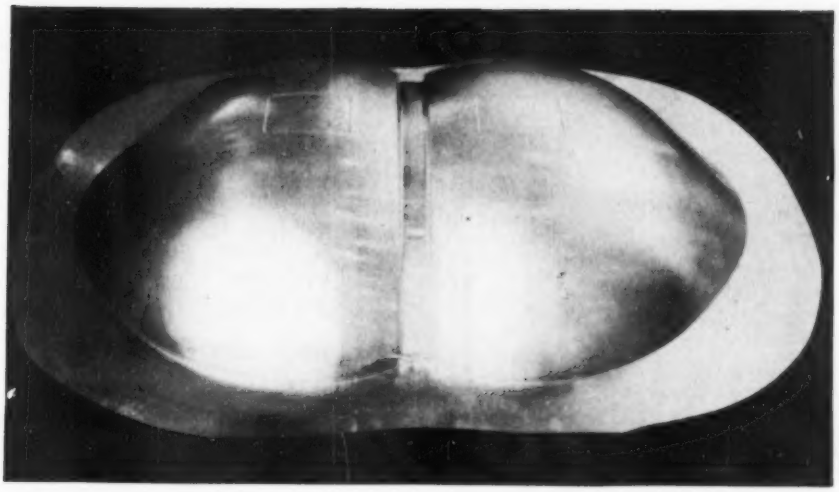


THESE TWO large and deeply drawn magnesium stampings are produced as one piece in a single press cycle and are cut apart subsequently

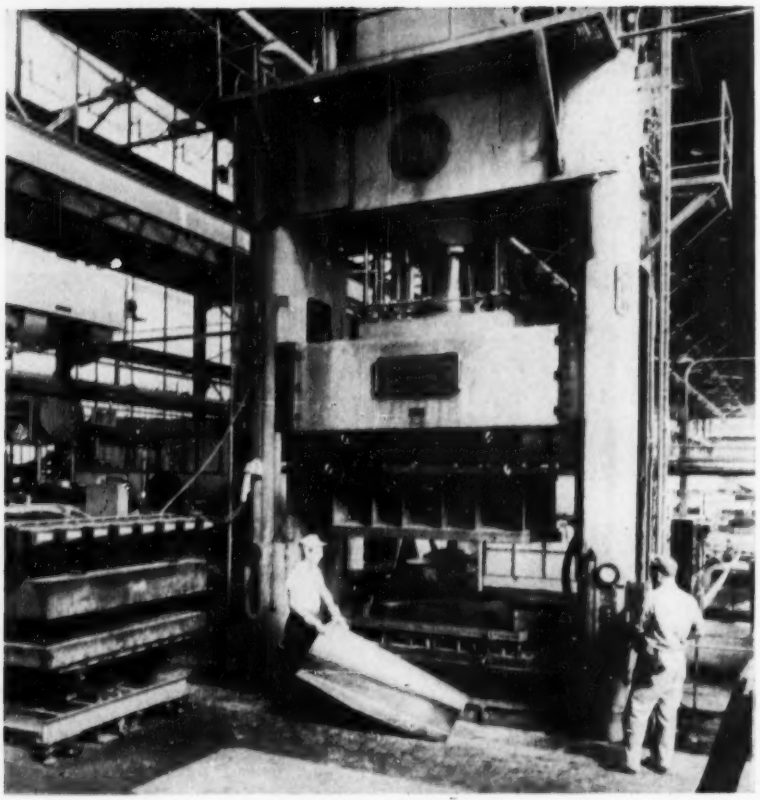
ALL OF THESE and many other deeply drawn stampings are produced from thin magnesium sheet. At left is a small press in which blanks are preheated electrically

ZONE-HEATED DIES DEEP-DRAW THIN MAGNESIUM

Sheets only 0.040 to 0.064 in. thick are drawn in depths to 30 in. in zone-heated dies in a 600-ton hydraulic press. Stock is carefully spray lubricated and generally is preheated

MAGNESIUM stampings, some believed to have the deepest draws yet produced in thin-gage metal of this type, are being drawn by The Emerson Electric Mfg Co, in its plant devoted to production of aircraft gun turrets and enclosures for them. Magnesium stock draws readily at optimum temperature when properly handled in drawing. It has proved difficult, however, to determine and to maintain just the right set of conditions, including a reasonably low percentage of scrap. F S 1H magnesium sheet is used but is converted to the soft or "A" condition by heating before and during drawing.

First step by Emerson engineers was the decision to employ



THIS 600-TON triple-acting H-P-M hydraulic press deep-draws aircraft gun turrets and enclosures. Dies are heated with gas, fed through flexible tubes. At left is an electric preheating press, at rear a furnace for reheating a few of the stampings that require redrawing

an H-P-M 600-ton, triple-acting Fastraverse hydraulic press — ample capacity—because this facilitated use of proper drawing pressures and application of pressures at rates best suited for uniform results for each drawn part. This proved to contribute greatly toward attaining the results.

The press, a triple-acting type, has a secondary action of 200 tons max. for a die cushion to actuate the pressure pad, and one for 30-ton maximum for a reverse draw, when the part requires this.

The particular magnesium alloy draws best at temperatures up to about 600 F, so it was planned to hold the metal at as nearly the chosen temperature as possible *throughout the draw*. If dies, far more massive than the sheet and with a much larger heat capacity, change temperature, they can absorb heat from, or transmit it to, the thin stock very rapidly, radically changing its characteristics.

Even a uniformly heated die may not give best results because its surfaces do not contact the metal uniformly or all at one time until the die is fully closed. It was, therefore, decided to have means for varying the heating of different parts of the dies and to hold optimum temperatures as nearly constant as possible.

In consequence, all dies are hollow and contain adjustable gas burners connected to supply lines by flexible tubes. Burners are placed and adjusted to yield the desired temperatures at different points by conduction through the 2-in. die walls. Proper burner location and adjustment are determined for each job.

Most dies have at least one thermocouple in the draw ring, one in the pressure pad, and one in the punch. These thermocouples, of course, measure temperatures only at the points at which they are embedded, but in most cases, desired temperatures in these key points usually indicate they are correct elsewhere, because they result from a given pattern of heating. In some cases, however, a movable surface pyrometer is applied and judgment, perhaps supplemented by a trial draw, then indicates whether or not a change in burner adjustment is needed. Surface Combustion equipment is used to mix air and gas before it reaches the burners.

HOLD FIXED TEMPERATURE

Usually, if pyrometer readings from thermocouples in set positions substantially agree with those that have given good results (and have been recorded) before, repeat performance will result. Efforts are made, however, to avoid cooling drafts on the dies and to run them at a substantially fixed rate. A rotary switch connected to a Brown pyrometer permits quick readings at all points where thermocouples are applied. Any necessary minor adjustment to burners, however, can be made by an experienced press operator and he seldom fails to obtain consistent and satisfactory draws.

Other factors besides die temperature that affect the draw are the temperature of the metal when it is placed in the die and the type and uniformity of the draw lubricant used, as well as the condition (especially the cleanliness and smoothness) of die surfaces. All these are held as nearly constant as conditions permit.

Initial stock temperature is usually attained by a Lindberg electric sheet-stock heating press thermostatically controlled to raise sheet temperature to or about 600 F. A new sheet or blank is commonly put in the heater press for each one taken out and is up to temperature by the time the prior sheet is drawn and removed and the die is cleaned.

Before blanks are placed in the stock heater, they are thoroughly cleaned in a vapor degreaser and further cleaned with a solvent wipe. They are then sprayed with a mixture of one part Dag Dispersion No. 41 (colloidal graphite) and four parts Lactol spirits. The spirits evaporate immediately, leaving a film of fine dispersed dry graphite

on the blank. Blanks are handled on edge before being placed in the stock heater. In some cases, preheating is done entirely in the draw die simply because this happens to be more convenient.

Magnesium sheet stock is quite soft at drawing temperature and any die scratches or lack of smoothness is likely to produce galling or other defects in the drawn parts.

Dies are Meehanite castings that are quite heat and warpage resistant and not easily corroded. Suitable allowances are made for expansion and a corresponding allowance is made for shrinkage of the drawn parts when they cool. Die surfaces are cast fairly close to shape but with allowance for machining drawing surfaces. Space is left for burners between the thick walls of the cavities and backings. The latter, of course, have flat surfaces outside for bolting to press platens and include bridges or webs that transmit pressure to the cavity blocks.

Before any die is used for drawing, it is heated in the press and must attain, at all thermocouple points, approximately the temperature indicated on a record developed from experience in prior drawing. Press controls are preset to insure correct pressures and the rates at which they are applied.

Once a given run is started, it is commonly completed at a fairly rapid rate and with only minor changes, if any, from piece to piece. Thus, the chief problem is to get the die and blanks ready. Time per piece may be longer than usual, chiefly because the die must be cleaned carefully after every draw. Regular running without delays promotes uniformity in results.

INDIVIDUAL SCHEDULES

Naturally, as parts produced vary greatly in size, as well as in depth and severity of draw, each die requires its own schedule of press and temperature settings.

Initially, it was expected that some redraw work would be required, especially as some reverse draws are needed. For this reason, a gas-heated Lindberg furnace was provided to reheat parts between draws. This furnace is seldom used, however, largely because it has been found possible to make even the deepest draws in one operation and, by using the third action, even a reverse draw can be made in a single cycle. Some draws are 30 in. deep, which is almost if not fully as deep as for single draws in any light-gage metal.

As a rule, blanks are fed from the blank-heater side, and drawn parts are removed from the opposite side.

MULTIPLE DIE

Because of the size of the press and the depth of draw, several parts with a like contour may be included in one draw die. This is not only economical but helps to balance the draw and to make the full-size drawn piece of more favorable shape than if the components into which it is cut had to be produced separately. Blanks are precut to a favorable contour when this is more convenient or gives better results than to employ a square or oblong blank.

In the case of parts like that in the left foreground of the group photograph, the third action of the press is employed to produce reverse draw beads along the arched ends. Such beads stiffen the ends and help to prevent springback and tendency for the stamping to open out after drawing, but are trimmed off before the stamping is completed.

TRIMMING & CLEANING

After stampings are taken from the press and cooled, they are trimmed of excess material. The stamping is then placed in a caustic cleaner tank in order to loosen and partially remove the graphite lubricant, then rinsed in cold water. The stamping is then placed in a 15 to 20% chromic acid solution to which 3 to 4% of potassium nitrate is added. This completely removes the graphite or drawing compound and also brightens the finish on the material. This dip is followed by rinses in cold and then in hot water. If the parts are then to be stored, they are given a corrosion preventive coating which is not removed until the part is to be chemically treated.

Success in producing stampings so large and deeply drawn from thin magnesium sheet has been most gratifying and promises to lead to much similar deep drawing in hydraulic presses, as the process is comparatively rapid and results in very light end products difficult to produce in any other way.

"Now, I remember . . ."

FLUORESCENT X-RAY SPECTROMETER is capable of making qualitative and quantitative analyses of high-temperature alloys and stainless steels in a matter of minutes. Accuracy is comparable to that obtained by chemical analysis, and lengthy training is not required

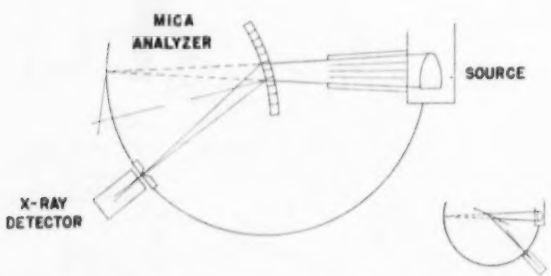
X-Ray Fluoroscopy Analyzes Alloys

By RUBEN M BRISSEY and GEORGE A CHASE
Thomson Laboratory,
GENERAL ELECTRIC CO.
Lynn, Mass.

New method of analysis gives accuracy comparable to that obtained by chemical procedures in a matter of minutes only. Instrument can be used for sorting stock or identifying materials, as well as for measuring coating thicknesses

For the past year, a General Electric XRD-3S fluorescent X-ray spectrometer has been used in the Thomson Laboratory for routine analysis of high-temperature alloys and stainless steels. This method, which in many respects is analogous to normal emission spectroscopy, is best suited for determining elements present in relatively high amounts. Hence, X-ray fluorescent spectroscopy for major constituents, and normal emission spectroscopy for minor components, give the desired accuracy for all ranges of composition.

Chromium, nickel, and molybdenum are quantitatively determined on over 25 production specifications of stainless steels and irons by X-ray fluorescence. In addition, chromium, cobalt, iron, molybdenum, and nickel in a production-type high-temperature alloy are similarly determined.



BENT MICA CRYSTAL separates radiation from elements emitting X-ray lines of nearly the same wave length. Original X-rays from tube, striking sample, cause the various elements to emit characteristic rays which are counted by a Geiger counter

Average time required to determine an element, including sample preparation, is 15 min. An operator can determine the five components in each of 20 high-temperature-alloy samples in a normal day.

Reproducibility is usually better than ± 2%. For example, results from ten samples from the same lot gave standard deviations of less than 1% of the amount present for each of the five components.

A flat, smooth area of sample surface is held beneath an X-ray tube window where it is subjected to high-intensity X-rays. The tube is operated at 50 kv and 50 milliamp, unless the intensity of radiation reaching the detector is so high that significant errors in counting will result. In such a case, the amperage may be reduced to one of several preset values. X-rays striking the sample possess sufficient energy to cause energy transitions within the innermost electron shells of the atoms. These result in the emission by the sample of radiation composed of X-rays having wave lengths characteristic of the specific elements present. A small sector of this radiation, emitted in the horizontal plane, passes through a short collimator and strikes a mica crystal, through which it passes and is diffracted by the crystal planes to give focusing at angles corresponding to those given by the Bragg equation:

$$n\lambda = 2d \sin \Theta$$

where n is the order of diffraction (1st order is used)

λ is the wave length of the radiation (Å units 1Å = 10^{-8} cm)

d is the distance between the diffracting planes of the crystal (Å units)

Θ is the angle between the incident radiation and the diffracting crystal planes.

The unit uses a bent mica crystal that has proved capable of separating radiation from elements that emit X-ray lines of nearly the same wave length. This is accomplished without sacrificing line intensity, which is measured by the Geiger counter.

The instrument incorporates adequate stabilizing devices to insure a constant intensity of X-rays to excite the sample. The intensity of a characteristic line is measured by a Geiger counter which is connected to a counting circuit and timer, from which the time required for a preset number of pulses or "counts" is obtained. An automatic chart recorder can be used to produce a plot giving the angle and intensity for characteristic lines as the goniometer moves the counter tube through desired limits for the angle Θ. This plot, in itself, represents a qualitative analysis.

QUANTITATIVE ANALYSIS

For quantitative analysis, the goniometer is set at the angle representing the maximum intensity of the line characteristic of the element to be determined. For all elements discussed here, the K lines are used. For heavier elements, it is necessary to use one of the more intense L lines. The time required for a preset number of counts is recorded and repeated to give four-time readings, and a total number of counts recorded equal to or greater than 16,384. For this number of counts the probable error in counting is 0.5%. The intensity of a line depends upon the concentration of the element in the sample. Thus, composition can be established from line intensity.

The sample used for quantitative analysis must have a flat surface preferably about 1 in. square. The sample area exposed to the exciting radiation is defined by the opening in the aluminum mask of the sample holder. While a smaller area can be used, the preferred area of ¾ in. square gives a higher line intensity than is obtained from a smaller exposed surface. The sample surface should fit snugly against the window opening. A smooth surface is required and is obtained by polishing on a belt sander. Special polishing is unnecessary.

The intensity of a line depends on the concentration of the emitting element and the nature of the alloy composition in which it occurs. For example, a fixed percent of nickel in an aluminum-base alloy gives a K line several times as intense as the same percent in an iron base. This situation, resulting from differing absorption by the sample for incident and emitted X-radiation, necessitates calibration of the instrument for various alloy types. In actual practice it has been found convenient to include a carefully analyzed reference sample from the same or a very similar specification with the unknown samples. Composition can then be calculated by simple proportion from the time required for n counts for unknown and reference and the known composition of the reference. The equation:

$$P_x = P_r \times \frac{T_r(n)}{T_x(n)}$$

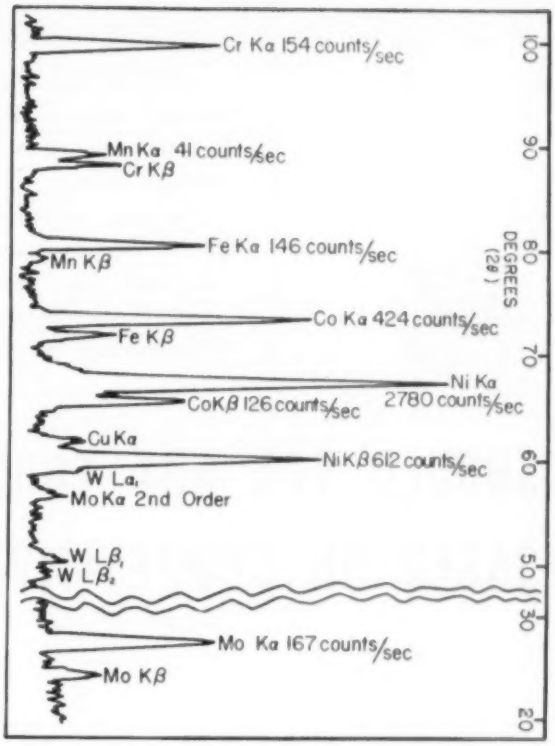
Where: P represents percent by weight

$T(n)$ represents time for n counts

and the subscripts r and x refer to the reference and unknown samples respectively.

Because the reference and unknown will have similar compositions, T_r and T_x will also be similar. This means any correction for background intensity, arising from scattered and external radiation that activates the counter, will not alter the value of P_x appreciably and can be disregarded. This procedure is used in routine determinations. Including the reference with the unknowns compensates for an instrument variation that may result from changes in alignment or replacement of components.

Certain limitations are inherent. The sensitivity varies for the different elements but, in general, it is best suited to the determination of elements present as 1% or more. As the radiation from elements having atomic numbers below 22 is highly absorbed by air, the crystal, and the counter window, this method requires special techniques when applied to elements lighter than titanium.



CHARACTERISTIC LINES for five major elements of a sample. Tungsten lines are from the tungsten target of the X-ray tube scattered into the detector system by the sample. Copper lines are scattered radiation from copper contamination of the tube

Every so often a cost-conscious executive without shop knowledge will say:

"We ought to buy tool-design work against the lowest of three competitive bids. Under the present system of an agreed hourly rate for designing time, we must be paying through the nose. Why don't you see what we can save by making a change?"

Thereupon, the responsible shop executive or purchasing agent must either present convincing arguments against the change or get information from an independent shop. Because this is a matter that deserves adequate analysis, I would like to discuss the pros and cons of the subject, based on 35 years of managing successful tool and die businesses and familiarity with trade practices.

SHOULD YOU BUY TOOL-DESIGN WORK BASED ON COMPETITIVE BIDS?

BY J J KOHL, President and General Manager, THE INTERNATIONAL TOOL CO, Dayton, Ohio

Buying tooling services from the lowest bidder—design only, building only, or both services—has one feature that recommends the practice to those who have engaged in it or who contemplate doing so. That seeming advantage—and it can be entirely illusory—is a *cheap* price.

By ruthless application of the competitive bidding system, it is possible to pick up numerous bidders more or less continuously, replacing those who drop out. Some bidders may need work badly and will temporarily undercut their usual prices. Others do not know how to figure their costs properly, and will take cut-price business until they fail. And there are a very few small shops that are exceptionally fast and capable, and willing besides to take a small profit—until they grow and their supervisory and other expenses increase.

Human nature being what it is, the ruthless buyer of bargain-priced design work or tools must set up protective barriers against:

1. Accepting poor design concepts.
2. Indifferent attention of the vendor to deliveries.
3. Request for price increases at every opportunity.
4. Other tricks by the unscrupulous or hard-pressed operator.

These protective barriers are not easy to establish, because it will be necessary to:

1. Make sure there is a "meeting of the minds" between tool engineer and purchasing department representing the buyer and the owner or other person legally authorized to represent each of the bidders, with respect to what is to be furnished and when and how it is to be delivered and for how much money and on what terms. Also, what penalties are to be invoked in case of default by either party.

This means that each bidder or prospective contractor must be given all the press or machine data, routing, other necessary specifications, ideas, etc., that will enable the bidder to prepare a design to suit the buying company's tooling, planning, processing or production personnel, as the case may be, and deliver an acceptable set of drawings without the necessity of redesigning or extensive alterations or corrections.

2. Have a clear understanding as to when the seller's responsibility ends after design drawings have been accepted by and delivered to the buyer, particularly with respect to unworkable features of design, errors in dimensions or tolerances, non-adaptability to buyer's production equipment, etc., and the extent and nature of any penalties in the event of post-delivery difficulties of this nature.

3. Method of determining price, and preparing claims or invoices, and provisions for payment for work done or material furnished in case of cancellation of order by the buyer while order is only partially completed.

4. Procedure for revising price when there arise part-print revisions, changes in specifications or other circumstances involving additional labor or material not contemplated or agreed upon at time order was placed.

To understand something of the problems of the tool and die shop, let us examine a hypothetical breakdown of how four bidders might arrive at prices for a given design job (see chart), remembering that other bidders would, likely, figure and estimate differently and arrive at different totals.

Bidder A—This man knows the risks in quoting an advance price, would rather lose the job than his profit. He knows his chance of getting the job is in one in three or four, hence doesn't spend much time in getting data from the customer, making preliminary sketches or otherwise using up time to develop a factual cost estimate. Instead, he estimates hours on the high side and raises his over-all hourly rate above his rate on a time-and-material basis. To be safe, he figures 30 hr for the job, instead of 20 to 25 hr, and an hourly rate of $5 instead of say $4.50.

Bidder B—This man is in the same category as *A* but needs work. He does little detail costing on the bid, but reduces his computed price arbitrarily. He may go so far as to forego all of his profit and part of his overhead in an effort to get the order.

Bidder C—This man has a small crew, supervises them personally, employs only the most competent men and pays somewhat higher wages than his competitors. He charges a higher hourly rate, but feels certain that he can turn out the job in 22 hours.

Bidder D — This man breaks down prices into all of the various cost components. He will be satisfied if his profit is $10 after taxes, but not happy if he realizes only $4 to $5.

SATISFACTION GUARANTEED?

Under the competitive-bid system, bidder *D* will get the job. But will the buyer and the seller be satisfied that the transaction was good business after the job is delivered?

If *D's* estimate is low, it is usually apparent by the time a job is about half finished. He may find that his designer takes 6 hrs instead of 5, and that the detailer and checker also must take a couple of hours longer. When this becomes evident, the natural reaction is to take short cuts. This amounts to tailoring the job to suit the price. But suppose the management agrees to putting in a few extra hours to do a good job. What then? Obviously, the anticipated profit has vanished. It is doubtful that *D* will again be willing to take jobs on a bid basis. So this "low bidder" is lost to the buyer and another one must be found.

I have always held, and my belief is shared by other responsible operators of independent shops, that it is false economy to restrict a tool-designing crew to a predetermined amount of time on any job. They should be free to spend a little additional time, and even a lot of additional time if necessary, when it is seen that an improvement in the original concept will contribute to more economical tool construction, a stronger tool or die, and most especially if a more

HOW FOUR SHOPS MIGHT BID ON SAME JOB

The following analysis is purely hypothetical in respect to overhead and profit rates. In any tooling center, the year-end profits of individual shops will bear no relationship—good times or bad—to the volume of business done.

Bidder A

	QUOTED PRICE
Fairly large tool and die company with ample backlog of design work in its tool and die design department	
Price to be quoted: 30 hr @ $5.00	$150.00

Bidder B

Fairly large tool and die designing service company badly needing work to keep its men busy		
28 hr labor @ average of $2.60	$72.80	
Overhead, profit & Federal income taxes at 100% of labor cost	72.80	
	$145.60	
20% of labor cost (72.80) for overtime	14.56	
Desired Price	$160.16	
Take off to make price attractive in an effort to book badly needed new business	$20.16	
		$140.00

Bidder C

Small tool-design company with limited capacity		
22 hr @ $5.75	$126.50	
material	5.00	
plus 10%	0.50	
	$5.50	
		$132.00

Bidder D

Small concern		
Estimate 5 hr designer's time @ 3.00 per hr (straight time)		15.00
" ½ " " " @ 4.50 per hr (overtime rate)		2.25
" 4 " detailer's " @ 2.20 per hr (straight time)		8.80
" ½ " " " @ 3.30 per hr (overtime rate)		1.15
" 3 " checker's " @ 3.20 per hr (straight time)		9.60
" ½ " " " @ 4.80 per hr (overtime rate)		2.40
Total Est Hr 13½ Direct Labor Cost		$39.20
Average per hour $2.90		
Estimated overhead costs (including rent, heat, light, depreciation, interest, postage, telephone, telegraph, insurance, taxes—excepting Federal income—supplies, travel and transportation expenses, salaries of office, clerical, supervisory, estimating and sales personnel, etc, based on overhead costs of most recent accounting period, modified to suit current operating conditions if necessary)—13½ hours		33.75
Average per hour $2.50		
Estimated Total Costs (except material, Fed Income taxes and profit)		$72.95
Total average per hour 5.40		
Estimated 18 sq ft bond dwg paper @ 6c—1.08		
54 " " blue printing @ 8c—4.32		
	5.40	
plus 10% material-handling charge	0.54	5.94
Total Estimated Actual Costs		$78.89
Add 10% for safety margin		7.89
Estimated cost price before Federal income taxes & profit		$86.78
Desired profit before Federal income taxes		15.00
Fixed price to be quoted		$101.78
Estimated profit before Federal income taxes as per above	$15.00	
Less estimated (30% approx) Federal income taxes on above profit	$4.50 (equal to 33c per hr)	
Anticipated Net Profit on Sale of $101.78 $10.50	(equal to 10% approx.)	

efficient tool will result. Certainly, it is easier and costs about one-tenth to one-fifth as much to improve the design on paper as it does to change the tool or die once it is built.

Let us turn now to the buyer of *D*'s design. The customer's tool engineer will be satisfied with the transaction if he gets a neat drawing and can find little to criticize. But he will start looking around for penalties to inflict on the tool-design vendor if:

1. It is immediately apparent from the drawing that a better tool would have resulted by designing a number of features a little differently, with more care and craftsmanship.

2. If he gets complaints of shortcomings in the design after the drawing has been released to the tool-making department, either in his own plant or an outside plant called upon to make the job.

3. If after the tool is put to use, it is evident that there is a lack of efficiency in making stampings or machining parts. None of these shortcomings are good for inter-company relationships and morale.

So far I have been talking about the pitfalls of a ruthless procurement policy. In actual practice, I don't believe that any responsible company would ever attempt, for long, to enforce such a policy. And this is why.

Experienced executives of metal-working plants have probably in the main come to about the same conclusions as I have about how business should be done. From my own business experience, fortified with knowledge of the mental processes of tool-shop owners and personnel gained in 25 years of activity in tool manufacturers' associations, I have come to these conclusions:

All segments of industry, large and small, should endeavor at all times in their dealings with each other to cultivate good-will and pleasant relations. These can be achieved by attempting to understand the other person's problems, by doing no mean, dishonest or unethical thing, and by exercising a reasonable degree of tolerance when trying circumstances arise.

Perchance, a few dollars may be saved here and there by demanding tactics. But I sincerely believe that these few dollars would, instead, be well spent if they foster goodwill on the principle of live and let live. For these extra dollars, which may mean the difference between profit and loss for the vendor, invariably pay off many times over in better performance, willingness to put forth extra effort when needed, and general harmony in inter-company relationships.

Very often the customer of the independent tool and die shop is a big-business company. It is my observation that big industry spends millions annually on public relations because it is good business to do so, but much too often forgets all about supplier relations. Perhaps the main reason for this fault is that they have not stopped to think about the small supplier's problems.

There are certain fundamental differences in the way jobbing shops and the usual industrial plant must set prices for products and services.

One of the most important differences is that the jobbing shop must use some of its best men to be successful in estimating and pricing tool and die work on competitive bids. If capable, such men are very highly paid. Very often they are the men who also must supervise the business. In any event, they must have an extensive trade background, be keen to recognize opportunities for profit and also "hookers", must know the type of work best suited to the facilities and personnel of the company. And, above all, such a man must possess rare judgment, a working knowledge of business practices, cost accounting, and business law.

BIDS RAISE COSTS

It is extremely wasteful to use the capabilities of a man such as this on competitive bidding. The chance of getting the order is small, because of the variables in pricing methods already set forth. Yet the cost of unproductive efforts of this man must be recovered, either on future prices from the same customer or from other more realistic and value-minded customers. In any event, the effect is to raise the costs of operation of all bidders and therefore to raise prices in the long run.

The pricing of tool and die design work, and even for the building of tools and dies, starts from a different base than that for pricing industrial products. Price lists for industrial products are compiled from known costs and adding the desired profit.

In contrast, the independent special tool and die shop, whether in the tool engineering or the tool making departments, produces no item in quantity, cannot stock its product, and does not have a continuous and widespread market for its services. Each job is a tailored design to suit a particular purpose. Furthermore, a tool and die company must cater to a wide group of customers, and handle their work during an overflow period of a few months out of the year. Different customers have different

"How do you want this, on the high side or low side?"

production ideas, their products are different, quantities vary greatly, accuracy requirements are not the same, and their needs for service come at different times.

Because of these conditions, the independent shop must be versatile. There is not much point, and the cost would be prohibitive, to the keeping of a set of drawings, part print, and related cost and price data for all jobs ever handled. Actually, pricing on competitive bids must be founded on the judgment and memory of the exceptionally qualified man who should be using his skills in the productive or customer-relations side of the business.

What it all boils down to, is this: there are too many people at a policy-making level in industry who are not well informed about the nature of modern special tooling and the men and shops that engineer these devices. For better inter-company relationships, such individuals should do more to find out how and why only the best special tooling supports their productive efforts to real advantage, and why the buying of tooling services is not in the same category as the buying of a gross of screws. True—the tool and die industry itself must accept the blame for this lack of understanding and should do something to correct or improve the situation.

As far as pricing is concerned, tool and die work is let today on the basis of all sorts of arrangements. Probably no one plan is best for everybody—planning in cooperation with the tool designing or designing and making source is always worth while.

In summing up, then, let me suggest to any company having an overflow of tooling to let out:

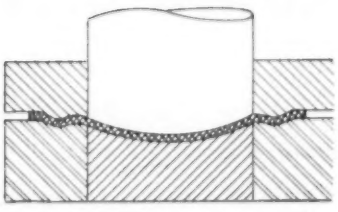
First, inquire carefully about the qualifications, character, past history and ability of the proposed sources.

Second, listen carefully if the special tooling source suggests a method of doing business, because he usually has one tailored to your needs that experience has shown to be most economical, and satisfactory to a majority of customers.

Third, keep in mind that the usual tool designing or tool building service will want, should be entitled to, and, in fact, must have to continue in business, a price, no matter how determined, that will be, not only adequate to permit doing a good job, but also sufficient to yield a net return equal to or better than he would earn on a time-and-material basis.

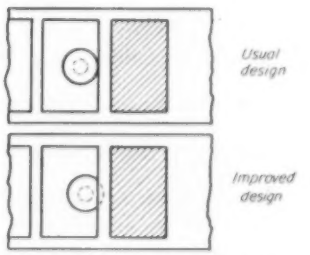
DIEMAKERS' KINKS

BY FEDERICO STRASSER



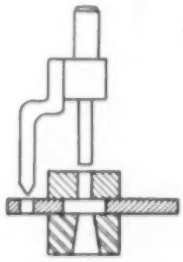
DRAW BEADS increase the holding and stretching power of the blank holder when drawing shallow shells of cylindrical or other shape. The shape and size of the bead must normally be determined by cut and try.

LOCATE STOP PINS in the blanked opening of the strip skeleton, so that they bear against an edge that is square with the strip edge. Tangent points of curves are satisfactory. An inclined surface should be avoided, because it will act to wedge the strip against the stock gage.

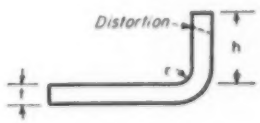


POSITIONING STOPS should have a flat on one side so that line contact, not point contact, is made with the scrap bridge. Strip location is better and the stop wears less.

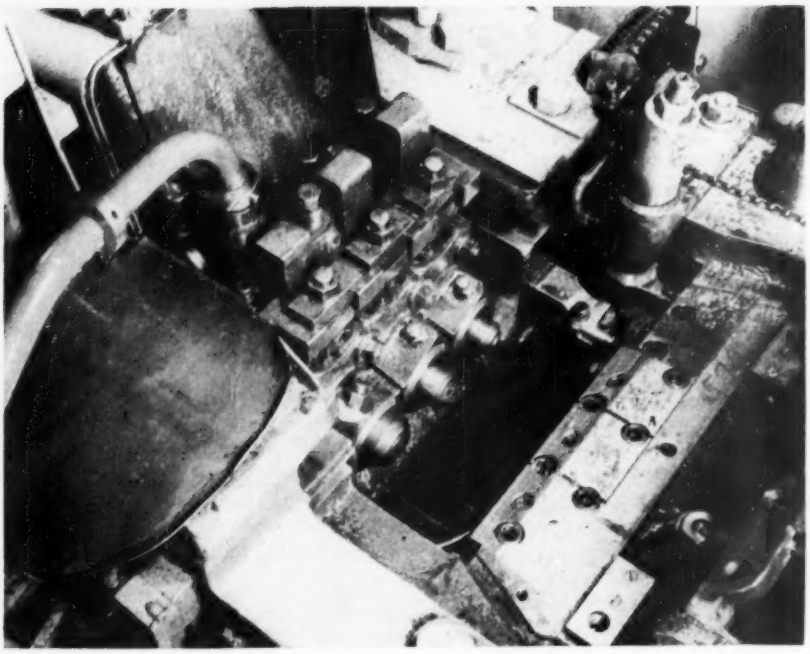
CURLS of various forms can be produced in the same die by regulating the stroke. Down stroke of the ram can be limited by an adequate bumper block between the tools.



SLIDE FEEDS for second-operation work are comparatively slow. Use a centering bar attached to the punchholder and located to enter a hole in the slide for greater precision of registration.



EDGE DISTORTION occurs with right-angle bends, when either leg is too short. Minimum height to cure this condition ranges between 1½ and 4 times the stock thickness. If one must have a square edge on a shorter leg, make that leg longer than required and trim it later.



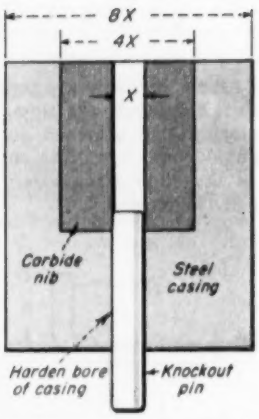
CARBIDE NIBS and hammer inserts are used in cold headers in the plant of a prominent auto maker for upsetting and extruding ⅜-in. bolts. Heading is performed at the second station, using improved Grade 190 inserts. Off-the-shelf carbide nibs help cut cost

How to make

CARBIDE COLD-HEADING DIES

Fewer machine stops for die changes, lower die cost per piece and maintenance of closer dimensional tolerances generally result when cemented-carbide nibs and hammers replaced steel die parts in upsetters

BY A EARLE GLEN, Carboloy Department, GENERAL ELECTRIC CO

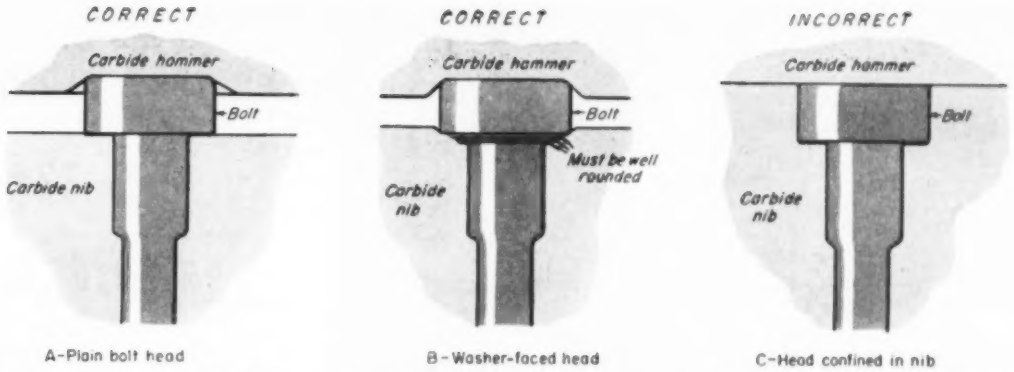


BEST RATIOS between nib ID and OD, and casing OD for carbide cold-heading dies are indicated above. OD of casing should be at least twice nib OD to insure adequate support for the carbide insert. Work shank should preferably be confined within the nib, with the knockout pin entered part way into the nib bore. But when the bolt to be made is long, wear can be equalized by hardening the casing bore

APPLICATION of cemented tungsten-carbide inserts in cold-heading dies and hammers has grown rapidly in recent years, particularly in the production of screws, bolts and rivets where long runs at relatively high speeds are desirable to minimize costs. With carbide inserts, cold-heading machines can be operated for longer periods between die changes.

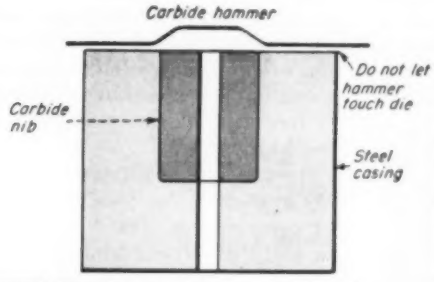
While there is hardly an application in the cold heading of metal parts in which Carboloy carbide die inserts and hammers have not been applied successfully, their popularity currently is growing fastest in the production of smaller bolts and screws (No. 4 to ¼-in. dia) and rivets under ⅜-in. dia, because these sizes represent the high-volume field of cold-heading applications.

The accepted "successful" range

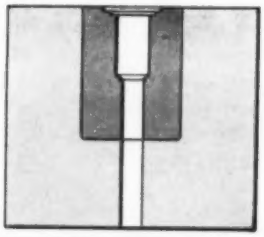


A-Plain bolt head B-Washer-faced head C-Head confined in nib

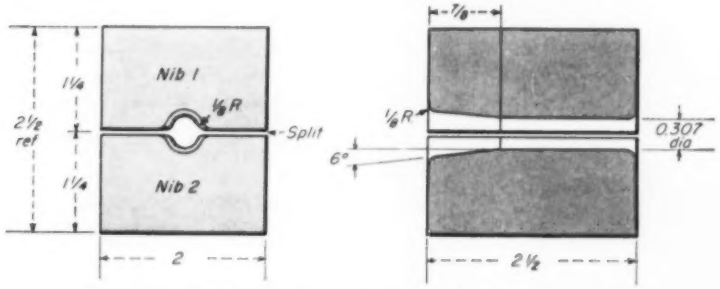
DAMAGE can be avoided only if the bolt head is not completely confined in carbide. Sketches *A* and *B* show correct setups for plain and washer-faced bolts. Never inset cavity for head in nib as at **C**. Eliminate all sharp corners in nib or hammer to avoid stress concentrations likely to cause die failure. Corners should be rounded off or filleted as indicated above for best results



WHEN SETTING up carbide dies in cold headers, make sure the hammer does not strike, or "kiss", the die. Carbides are so resistant to plastic deformation, damage to tools or machines may be caused if there is interference at forward end of heading stroke



IN MANY OPERATIONS, pointing can be combined with heading by restricting bore of carbide die nib as indicated above. Allowance for this practice has been made when developing standard nibs



ROTARY SWAGING DIES are another application for the new Grade 190. These dies must withstand repeated impact of the swaging operation. This is a typical die for swaging rods and tubing

of applications now includes nominal bolt and rivet sizes up to ¾-in. dia, thus covering approximately 93% of total production requirements. But economical utilization of carbides in dies and hammers for the larger sizes depends on whether production runs are sufficiently large to justify the higher cost.

Ratio of life of carbide die and hammer parts compared with steel dies and hammers is about the same for nonferrous as for steel parts. The greater softness of the nonferrous materials generally is offset by their increased abrasiveness because of greater susceptibility to oxidation.

In general, carbide die and hammer life ranges somewhere between 10 and 40 times that obtained with steel dies, the average varying between 15 and 20 times. From a cost standpoint, including original and maintenance charges, a life ratio of about 10 to 1 usually pays off. Life ratios higher than 40 to 1 have been obtained in some cases, but these are the exceptions rather than the rule. One dieset, for example, produced 60,000,000 rivets, consisting of the original size plus two recuts to produce larger sizes.

Aside from the longer life of the dies themselves, use of carbides for cold-heading operations has another important advantage in producing screws and bolts — thread-rolling dies last longer because of the ability of the heading dies to hold closer extruded-shank tolerances over long runs. Absence of variation in shank diameter minimizes overloads on the rolling dies. Even an increase of only 0.001 in. in shank diameter will affect roller life materially.

In general, design of carbide die inserts and hammers for cold-heading dies follows closely the design of similar hardened-steel dies and hammers. There are, however, several important requirements to be watched if the most economic application is to be achieved.

Grade of carbide should be selected carefully. The grade generally most suitable for cold-heading work is tough and soft as compared to other cemented carbides used for cutting-tool and wear-resistance applications. But its hardness and modulus of elasticity are much greater than those of steel—which means that it does

not deform or "give" to the same extent as steel.

So the cemented-carbide die insert, or "nib," must be supported adequately in its steel casing. Generally, OD of the case should be twice the OD of the nib. Also, nib OD must be larger than the maximum head size to be upset — or the less-wear-resistant steel case will wear away. Generally, OD of standard nibs for stock sizes of screws, bolts and rivets is four times the shank diameter (ID of nib). As head diameters seldom are more than 2.3 times the screw size (or shank dia), this extra carbide on the nib OD facilitates recutting dies to larger sizes.

In addition, high hardness and high modulus of elasticity of the carbide nibs and hammers makes it necessary to insure that space is provided into which the upset workpiece material can flow. An upset screw, bolt, or rivet head should never be confined completely in a carbide heading-die assembly. Pressure exerted by excess stock on the head of an upset part may permanently damage the die. It is satisfactory to recess the die for washer faces, but not for the major portion of the head.

Best practice is to leave a slight clearance around the edge of the head cavity so any excess metal can flow out in the form of a small flash. Usually this flash will be so small that it will not affect the part, even if not removed. In addition, it is best to eliminate sharp corners in the die or hammer inserts. Such corners develop high stress concentrations and sometimes result in the breaking off of sections of the carbide. It is best to leave a small radiused fillet in all corners.

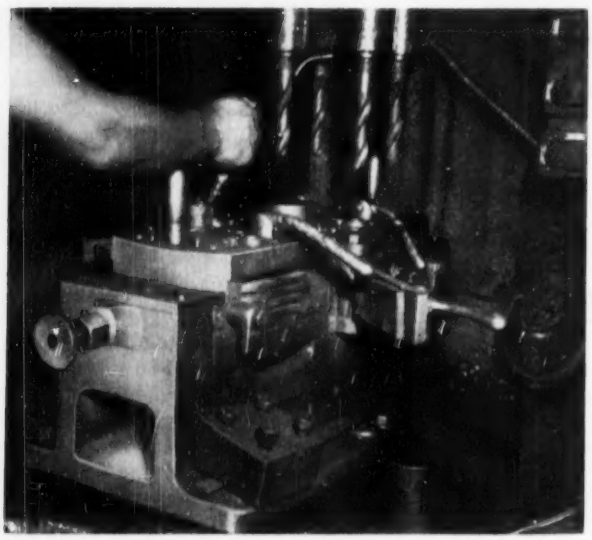
Wherever possible, shank of the piece being headed should be confined within the bore of the carbide nib—and standard nibs now are long enough to handle the majority of bolt lengths. This added stock also permits regrinding the die face from time to time. For exceptionally long bolts or screws, standard nibs can be used if the back portion of the steel casing is hardened to give better bearing support for the knockout pin and to provide for more balanced wear.

Carboloy generally recommends the use of improved Grade 190 carbide for making cold-heading die nibs and hammer inserts, because this grade can be held consistently to close tolerances, and can be easily drilled and turned—thus minimizing costly lapping operations when making new dies or recutting die inserts to larger size when worn.

The same grade also is economically applicable for making inserts for press dies employed for swaging and sizing (cold coining) mild-steel parts—like many parts for typewriters and office computing machines. While softer than most other grades of cemented tungsten carbide, Grade 190 is tough and will withstand impact loading better than the other grades.

NOMINAL PROPERTIES OF SOME CEMENTED CARBIDES

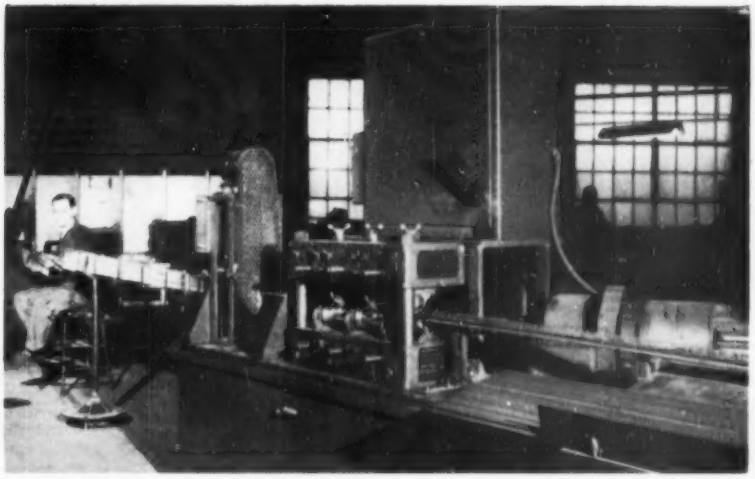
Grade Designation	Composition % by Weight WC	Co	Hardness Rockwell A 60-Kgm Load	Density gms/cm³	Transverse Rupture Strength psi x10³
883	94	6	92.0	14.95	215
44A	94	6	91.0	14.95	230
55A	87	13	88.2	14.20	330
190	75	25	84.5	13.15	375



QUADRUPLED SPEED

Special drill fixture built by The Babcock & Wilcox Co, Barberton, Ohio, quadruples drilling capacity of a 4-spindle machine in which thousands of stoker links are machined. Double-end construction and quick-clamping side doors permit loading and unloading at one end while eight pieces are drilled in opposite end. Fixture is locked with a spring-loaded pin in front of the operator

Speeder feed speeds tube straightening



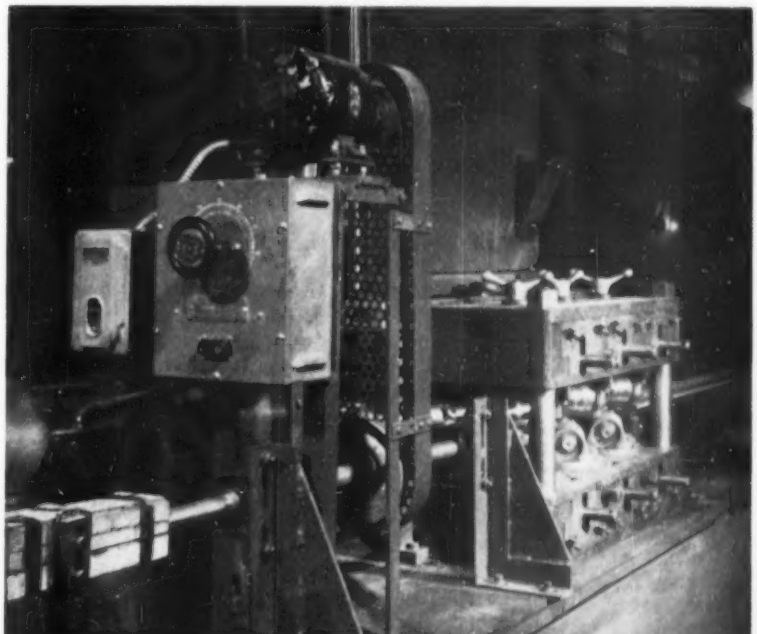
NICKEL-CHROME ALLOY TUBING in diameters from 5/16 to ½ in. is straightened at 250 fpm in this setup. The operator of the rotary straightener, seated at left, feeds 12- to 14-ft lengths of tubing into a 6-ft. run-in box. After being straightened to not more than 0.006 in. deviation per ft, the alloy tube emerges onto a narrow run-out rack. Each length of tubing then drops of its own weight onto the slightly sloping top of a collecting table

LATE in 1951, a customer who makes electric-range heating elements inquired of Metal Forming Corp., Elkhart, Ind., if nickel-chrome alloy tubing could be furnished with less than commercial deviation from straightness, and with surface imperfections controlled to a minimum. Tube diameters varied from 5/16 to ½ in., with wall thickness ranging from 0.020 to 0.030 in. Lengths of tube were 12 to 14 ft.

Metal Forming had been producing alloy tubing for many years. Its product was fabricated with a relatively high degree of straightness and surface quality. It did not, however, meet the specifications of this customer. Straightening equipment installed was incapable of high-speed precision work, and tiny scratches on tube surfaces from guide rubbing were considered a necessary evil. The solution was obviously a new setup.

More than a year has elapsed since a Mackintosh-Hemphill six-roll rotary straightener replaced the older machines. Straightening alloy tubing at 250 fpm, the Model AXY machine (rated speed is 350 fpm) attains straightness within 0.006 in. per foot, and 0.036 in. or less per 6 ft.

Tubing is run dry through the machine, without lubricant on even the straightener rolls. One plant engineering development by Metal Forming has considerably aided production—a "spinning feed" for the straightener.



THIS "SPINNER" is unique and a supplement to tube-straightening machines. As a 12-ft length of alloy tubing is inserted through the 6-ft wood run-in box, the entry end of the tube passes into a 1-in. rubber-lined steel pipe. This pipe is spun by a belt drive through a variable-speed assembly so it rotates at exactly the same speed as the six rolls in the straightener. Speeds of both spinner and straightener can be varied to suit job and production requirements

Lengths of tubing are inserted in a tapered wood run-in box by the operator who sits some 8 ft from the machine. As the length of tubing passes out of the other end of the box, it enters a 1-in. steel pipe, lined with rubber. This pipe is driven and spins at a speed equal to that of the straightener rolls. Thus each length of tubing is rapidly spinning by the time it enters the first set of rolls. This has not only expedited tube straightening but has minimized the gall at the tube end from the impact of the first set of rolls. Both straightener and "spinner" have variable-speed controls.

MILLING-CUTTER BLADES (left) of ¾-in. square steel faced with Grade 78-B Carboloy are semifinish ground in special fixture (right) with silicon-carbide wheel. Four blades for a milling cutter are set into slots in grinding fixture so radial relief will be the same on all blades. Carboloy does this operation in a Landis 10x24-in. universal grinder with a 12-in-dia, 1-in.-face, 60-grit, black SiC wheel (37C-60-IH12). Wheel runs at 5500 sfpm, preferably with a flood of coolant to minimize wheel wear and danger of heat damage. Diamond wheel would not be suitable because steel and carbide are ground at the same time. Blades are rough ground at about 0.005 in. per pass depth of cut, then semifinished with the same wheel and setup at about 0.001 in. per pass. Finish produced is 10 to 12 mu in. rms. Final offhand sharpening of the cutting edges is done wet with a 100-grit diamond wheel

SILICON-CARBIDE WHEELS FOR CARBIDE GRINDING... *a roundup*

In recent months, much attention has been paid to the possible ways of grinding carbide tools. Possible shortages of diamond wheels have stimulated tests of other methods, leading to eleven previous articles (see box) dealing with many aspects of the problem. Here is a roundup of further data on the possibilities of silicon-carbide wheels

BY ANDERSON ASHBURN, ASSOCIATE EDITOR

Diamond wheels have been the standard method for grinding carbide tools for many years. Among the alternate methods that have recently attracted wide attention are silicon-carbide wheels, abrasive belts, and electrolytic grinding. Of these, the silicon-carbide wheel has received the most extensive testing—with both conventional coolants and CO_2. Most generally economical in using SiC (silicon carbide) wheels has been the practice of roughing with SiC and finishing with diamond wheels, though examples have been reported in previous articles (and later in this one) in which SiC has worked out for both roughing and finishing. In other cases, it has been reported less desirable for either.

When roughing with SiC, heavier infeeds and rapid traverse are possible. These would ruin diamond wheels. Silicon carbide must be in soft grades and friable bonds to prevent burning the carbide. Thus wheels wear away rapidly, making it more difficult to hold dimensions. Edges of the work are likely to be somewhat rounded because of the higher pressure between wheel and work.

Several manufacturers of grinding wheels are now producing wheels in mountings for carbide tool grinders. They endorse these wheels with varying degrees of enthusiasm. One says that nothing is quite up to the diamond wheel, while others feel that, properly applied, the new wheels are quite

satisfactory. There is some variation in recommended wheel specifications, some advising resinoid bond and some vitrified bond. Typical specifications are shown in the table.

When resharpening large circular cutters, it is difficult to hold size with a SiC wheel. Caterpillar Tractor Co has overcome this difficulty by taking four finishing cuts with quartered starts.

In grinding chipbreakers, SiC is not considered satisfactory where wheels of this cross-section are required. For large tools that permit large-diameter wheels of relatively thick cross-section, it may be practical to grind chipbreakers with SiC.

In addition to the vitrified-bond wheels its engineers recommend, Simonds Abrasive reports that recently resinoid wheels in the 60-grit size (C60-M5-B3) have been used for finishing, but as yet their results are not conclusive.

With SiC wheels there is some advantage to grinding both steel and carbide, particularly with resinoid-bond wheels. This helps to keep the wheel free cutting and avoids burning the carbide. In such cases, work would be positioned to move the wheel through the carbide and toward the steel.

When silicon-carbide wheels are used, the question frequently arises as to the choice between the green and black wheels. What is the difference? Certainly, the color. It is easier for the operator to see the work against the green wheel. Any other difference in the two appears to be negligible. Some people report that the green wheel is more fragile, others that the green wheel has a "softer feel" in the same grade, but any differences that exist, other than color, do not appear to be measurable.

There follow some additional examples of the ways in which companies with sufficient volume to justify experimenting with the various methods are employing silicon-carbide wheels. There have been other case histories in earlier articles (see box).

SINGLE-POINT TOOLS

Single-point tools are being ground with SiC in the toolroom at Allis-Chalmers. Previously a 150-grit vitrified-bond diamond wheel (D150-N-100V-⅛") was the standard in this crib. The green-grit SiC wheels are 6-in. dia, ¾-in. face, steel-backed straight-cut wheels of 150 and 180 grit (GC150-I11-VR and 39C-180-I8V in vitrified-bond wheels and 37C-150-K7B5 in resinoid bond).

With the number of single-point tools ground monthly in this toolroom remaining fairly constant, seven SiC wheels per month are required as compared with the two diamond wheels per month formerly consumed. This represents a saving on wheel cost of better than $600 a month. Wheels are run at 3450 rpm as before.

No difficulty with wheel grooving has been encountered when grinding flat tool surfaces, such as faces, flanks, and ends. However, there was a tendency to groove wheels when freehand grinding nose radii. This has been minimized by roughing flank, end, and nose radius clearance at an angle about 2°

Typical Silicon-Carbide Wheel Specifications Recommended By Wheel Manufacturers For Grinding Carbide

Offhand Grinding		
ROUGHING	Carborundum	GC-60-H11-VR
	Chicago	49C-60-J8-VXL
	Norton	39C-60-18-VK
	Simonds	GC-60-19-V3
FINISHING	Carborundum	GC-100-G5VR
	Chicago	49C-120-18-VXL
	Norton	39C-100-H8-VK
	Simonds	GC-120-19-V3
Cutter Grinding		
ROUGHING	Bay State	C-60-H6-B2
	Carborundum	GC-60-N3-BA and GC-60-L3-BA
FINISHING	Chicago	49C-80-J8-VXL and 49C-120-18-VXL
	Norton	39C-60-J8-B
	Simonds	GC-60-H9-V3 and GC-120-H9-V3
Chipbreakers		
	Carborundum	GC-60—P3-BA
	Sterling	C-120-M12-VK
Surface Grinding		
ROUGHING	Carborundum	GC-100-G5-VR
	Chicago	49C-60-I8-VXL
	Norton	39C-60-J8VK
	Simonds	GC-60-18-VXL
FINISHING	Carborundum	GC-100-G5-VR
	Chicago	49C-120-I8-VXL
	Norton	39C-100-18VK
	Simonds	GC-120-19-V3

INSERTED-BLADE MILLING CUTTER is sharpened in special grinder at Caterpillar Tractor. Cutters up to about 42-in. dia can be handled with SiC wheels by using quartered starts

greater than required, then finishing a 1/32- to 1/16-in. land at the specified angle.

Rate of metal removal with the SiC wheels is estimated to be about what it was with diamond wheels. However, surface finish is not as consistent as it was with diamond grinding, though adequate for the operations for which these tools are required.

MILLING CUTTERS

Tests at Caterpillar Tractor Co of SiC for single-point tools have not yet been successful enough to justify changing procedure there, but they are using SiC for sharpening carbide-tipped milling cutters, vitrified-bond for roughing, resin-bond for finishing. In roughing operation, a 7° clearance is ground back of the cutting edges; when finishing, a 1/16- to 3/32-in. land at 5° clearance is ground.

Large cutters having clamped-in steel blades with carbide tips are rough and finish ground with 12-in.-dia, 1-in-face, straight side cup wheels. Blades are rough ground, leaving about 0.001 in. for finishing. Four finishing passes are then made around the wheel, removing about 0.005 in. per pass. These are quartered starts; that is, each finish pass is started 90° from the previous one on the cutter so that breakdown of the resin SiC wheel will not result in high teeth on one side of the milling cutter. There is no sacrifice in accuracy, holding face run-out within 0.0015 in. on 38-in. dia cutters. Time is about the same as with a diamond wheel.

Carbide-faced centerless-grinder rest blades are also resurfaced with SiC wheels at Caterpillar Tractor. For this operation, an open-structure wheel with coolant slinger for applying water (with rust inhibitor) has practically ended heat checking.

CARBOLOY PRACTICE

New single-point, carbide-tipped tools are ground at the Carboloy Dept of General Electric with SiC for roughing, diamond for finishing. Tips are positioned whenever possible on the steel shanks in such a way that it is seldom necessary to grind away the shank when sharpening the carbide tip on a new tool.

Side and end angles of the tip are roughed to within 1/32 in. of the cutting edge with 60-grit silicon-carbide (either green or black) wheels. These are 14-in.-dia, 1½-in.-face wheels run at 5500 sfpm in conventional double-end floorstand carbide-tool grinders. This operation is generally performed dry because a minimum amount of stock is removed from preformed bits and, with normal care, there is little danger of heat damage.

Top and side surface are finished in automatic single-point tool grinders developed by Carboloy. Pressure of the tool against the wheel is preset (with spring-loaded holders) and the tool is constantly oscillated across the face of the wheel. Diamond cup wheels (6-in. dia, ¾-in. face, steel backed) have a 100-grit, vitrified bond, 100% concentration, with ⅛-in. diamond thickness on the rim face.

Front face of the tip is finish-ground offhand with the same type of diamond cup wheel in a conventional double-end floorstand grinder. Water with a rust inhibitor is delivered by tube to the center of the wheel, carried by centrifugal force across the face of the wheel as a coolant.

Radius at the point of the tool is finish ground (from a preformed square corner when tip is smaller than ½-in square, from a preformed radius in larger tips) with 120-grit SiC cup wheel in a 14-in., double-end grinder. Tool must be kept moving across the face of the wheel to prevent grooving the wheel.

Chipbreakers are ground as needed with a diamond wheel. Shank of tool is positioned on the table of surface grinder with angle blocks. The 7-in.-dia, ⅛-in.-face, 100-grit diamond wheel can be either 50% or 100% concentration, vitrified or metal bond.

When small lots or special sizes or shapes are required, Carboloy surface grinds the steel shank and carbide insert to within 0.003 to 0.005 in. of size with a 60-grit SiC wheel, then finish grinds with a diamond wheel.

Carboloy engineers report that resinoid-bond diamond wheels are preferable on solid carbide work, both surface and cylindrical, when a coolant can be applied. For interrupted cuts on cylindrical parts, a vitrified bond gives better life with equal cutting action. The tougher bond resists the chopping action of the carbide edges.

The depth of cut with a 100-grit diamond wheel is limited to 0.001 in. per pass on surface and cylindrical work in order to obtain the most efficiency from the diamond wheel. For finishing with 220-grit wheels, the depth of cut is limited to 0.0005 in. per pass. In either case the rate of traverse varies according to the operation and the finish required. This procedure is followed for about 95% of their carbide grinding. For a few of their harder grades it is necessary to reduce the depth of cut, rate of feed, and wheel traverse, and to change to a softer bond to avoid heat checking.

For further information on grinding carbide tools consult these recent articles in American Machinist

How to Conserve Diamond Wheels *AM*—Feb 18, 52, p173

Arc Machining Makes Hard-to-Cut Jobs Easy, *AM*, Mar 3, 52, p136

New Processes Will Machine the Unmachinable, *AM*—Mar 17, 52, p130

Soft Steel and Ultrasonics Machine Carbide, *AM*—Sept 15, 52, p141

Why and How We Must Conserve Diamond Bort, *AM*—Nov 10, 52, p151

Electrolytic Grinding, *AM*—Nov 10, 52, p154

Britain, Too, Has Electro-Spark Machining, *AM*—Nov 10, 52, p159

CO_2 Cools Carbide Grinders, *AM*—Dec 8, 52, p97

Abrasive Belts Grind Carbide, *AM*—Dec 8, 52, p102

No Cause to Worry Over Diamond Bort, *AM*—Feb 2, 53, p145

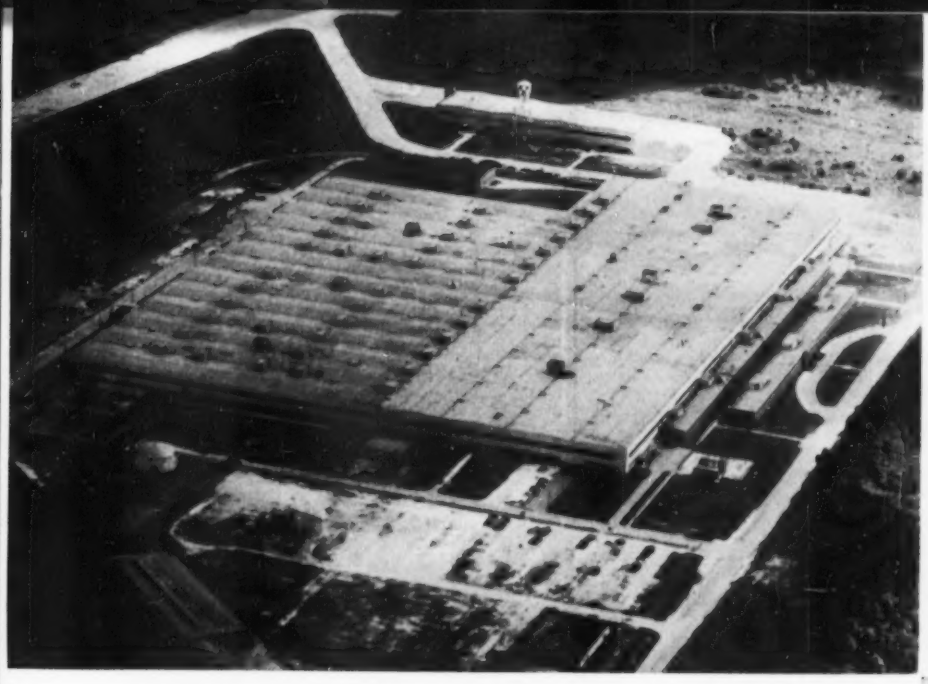
Economic Factors Must Govern Wheel Selection for Grinding Carbides, *AM*—Feb 16, 53, p165

Cadillac Teams CO_2 With Silicon Carbide to Grind Carbide Tools Better, *AM*—Feb 16, 53, p172

Diamond Dilemma, *AM*—Mar 2, 53, p141

Carbide Tools Ground Without A Diamond Wheel, *AM*—Mar 16, 53, p195

Why Boeing Wets Diamond Wheels, *AM*—Apr 13, 53, p164



BY E J TANGERMAN,
EXECUTIVE EDITOR

Built as an aircraft factory, Michoud has 40-ft ceilings, its own landing strip, is fully air-conditioned. It is 43 acres under one roof

how Dixie POWERS FIGHTING TANKS

Michoud Ordnance Plant is a Class II Army installation operated by Chrysler Tank Engine Division, Chrysler Corporation, under jurisdiction of the Birmingham Ordnance District. The plant site, one of Louisiana's early sugar plantations, is still marked by two brick chimneys of the old sugar mill at the main entrance to the plant. About 15 miles east of downtown New Orleans, the property was taken over for a World War II shipyard, but abandoned before completion and an aircraft plant erected by Defense Plant Corporation to manufacture plywood cargo planes.

Jan 29, 1951, Chrysler received a letter order for engine-plant facilities from Army Ordnance, and occupied this plant June 12, then renamed Michoud Ordnance plant. First engines were shipped April 30, 1952, to the Chrysler Delaware Tank Plant, Newark, Del.

The plant, on a deep-water channel to the Gulf, also boasts a 5,500-ft landing strip, and major rail and highway routes within a quarter mile. There are 2,245,000 sq ft of floor space, 43 acres of it under one roof and all of it air-conditioned. It also has a sewage-disposal system large enough to handle a city of 35,000 people.

Some 2,000 machines will eventually be installed (1100 in now), several hundred of the present units being war surplus to be replaced with special machines. Tooling totals 42,000 items, ranging from an 0.015-in. drill to a 1-ton broach, yet the plant uses 1,100 vendors for materials and supplies. It presently has 24 engine-test cells, now in process of expansion to 48. An aluminum cylinder-head foundry, now under construction, will be able to melt 3 million lb of aluminum per month.

As sidelights, these statistics are interesting: 27,000 ft of overhead conveyor, 4,800 ft of floor conveyor, 500 miles of electric wiring, 5,300 mercury-vapor lights, power use equal to that of a city of 120,000. Currently, some ¾ million gal of high-test gasoline are used monthly for production testing of engines, but the hope is to replace this with propane gas, by applying mixers on engines in test cells. Fuel cost would then be about 2% of that at present.

The engine being produced is the AV 1790-7 air-cooled V-type, which produces 810 hp and weighs 2,600 lb, being made to aircraft-engine specs and of lightweight, high-strength materials. Its 12 cylinders are cooled by two fans which draw air through the muffs and discharge it vertically.

Two major changes were made in adapting the building for aircraft production. One was to modify machine layouts to place heavier units on piles driven for the shipyard in 1942, thus saving the government an estimated million dollars. The other was to install a grillage 18 ft above the floor to carry conveyors; the building, designed for aircraft, has a 40-ft ceiling.

In conveyorization, the floor system is a Webb Towveyor merry-go-round for final engine assembly and reassembly after "green" run. The overhead monorail conveyor system totals about 5 miles, being supplemented with a mile of "carry-all" for handling small and spare parts, two miles of Logan gravity-roller conveyors, and a mile of belt conveyor. There are also some 550 hoists, plus lift trucks, power trucks, tractor trains and other handling units to make this an unusually highly mechanized setup.

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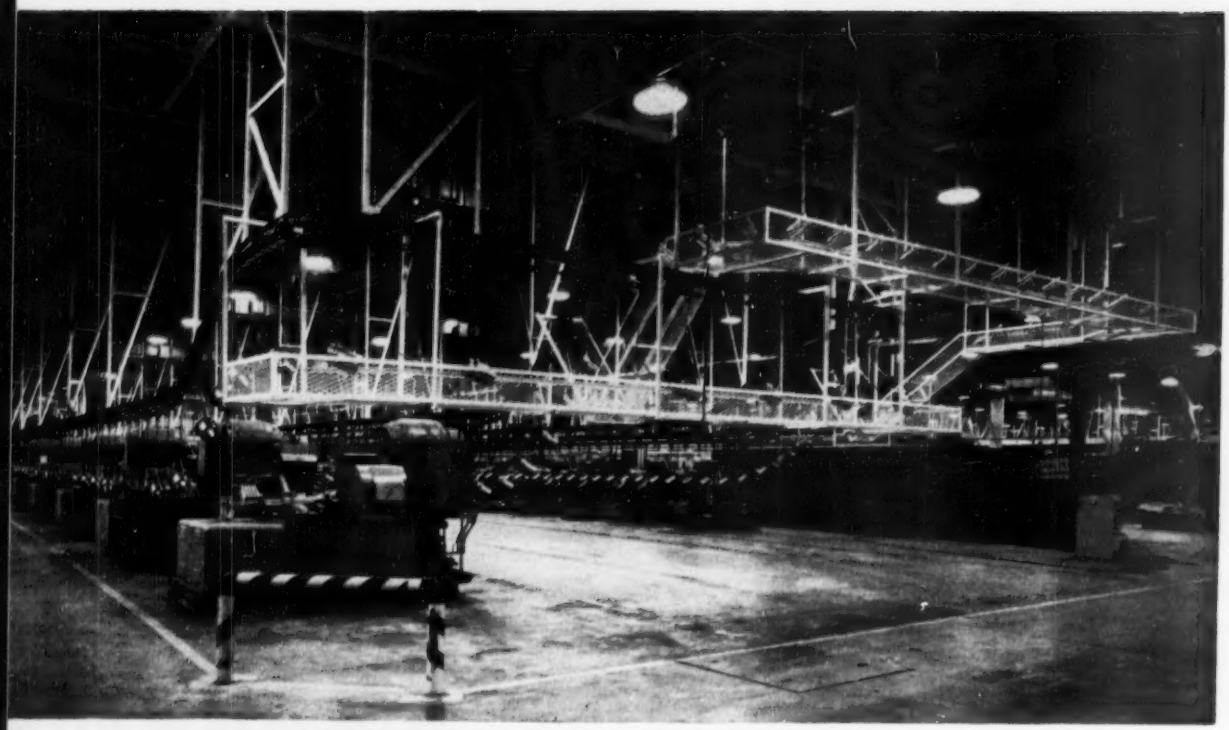
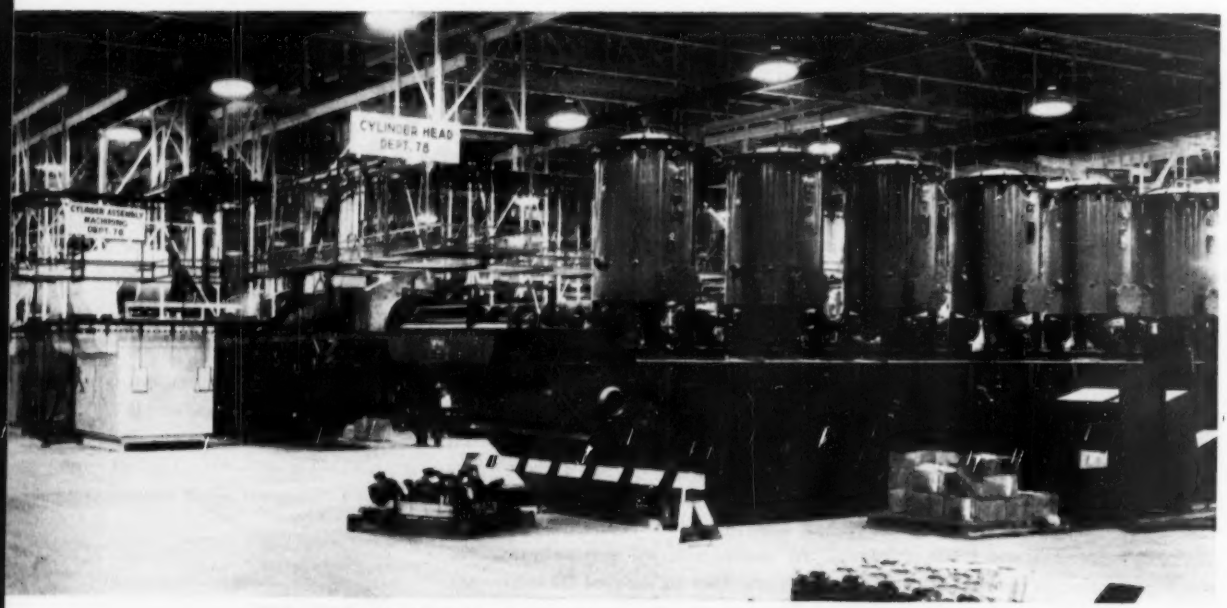
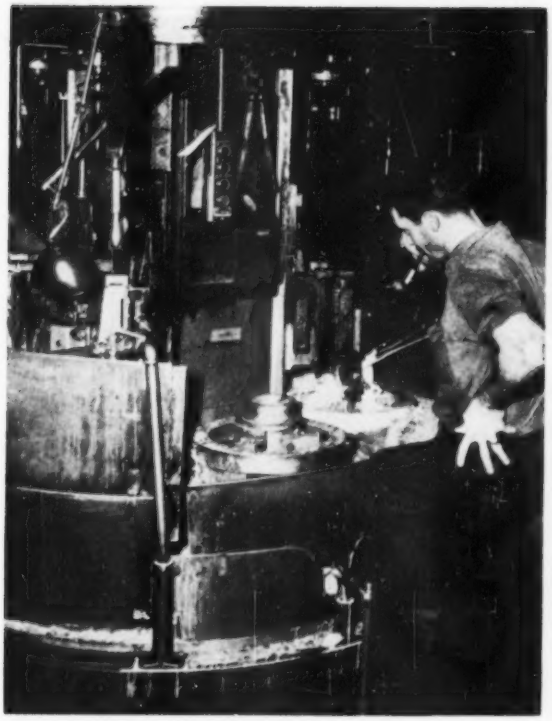


CYLINDER-BARREL EXTERNAL MACHINING is done on a line of Fay automatics. The steel barrel, a forging turned to close tolerances, is surrounded by a cast-on aluminum "muff" and topped by a cast-aluminum finned head in later operations. Cycle time is 4 min.

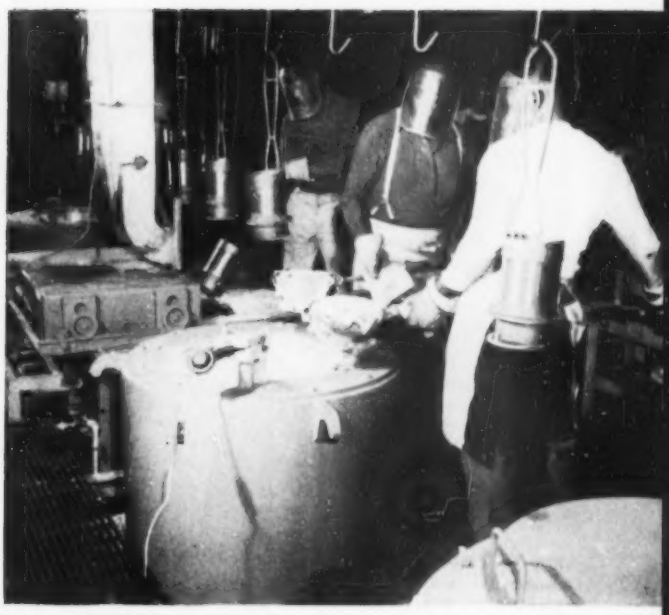
CYLINDER BARRELS... steel, with aluminum "muffs,"



FOURTEEN COOLANT FILTERS take care of various machining lines. Here is a Hoffman unit, in the cylinder-head department, for cleaning soluble oil of steel chips and dirt



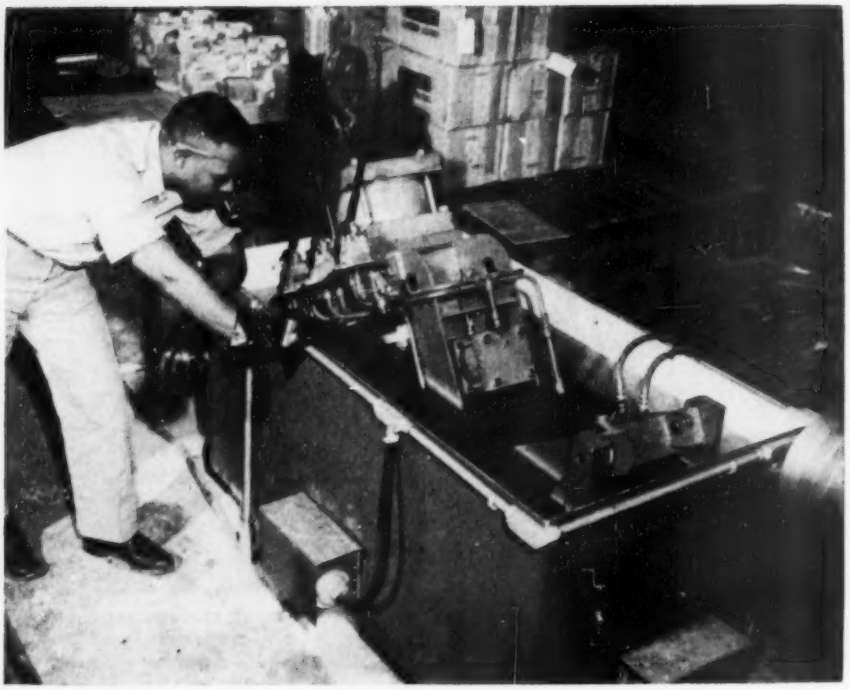
CYLINDER BARRELS ARE MACHINED internally and on the skirt end in a battery of 17 Bullard Mult-Au-Matics. Here a finished barrel is shown at the loading position. Cycle time is 4 min. There are a total of 23 machines of this type in the plant



A SPECIAL PROCESS has been developed for the aluminum "muff" on the cylinder barrel. Steel cylinder barrels come in on a conveyor to the salt furnace in background. They are hand-plunged in this fluxing salt, then placed in a mold at right rear. Molten aluminum from the electric pot in the foreground is ladled in to form a solid muff weighing 17 lb, later finned in multi-tool high-speed lathes

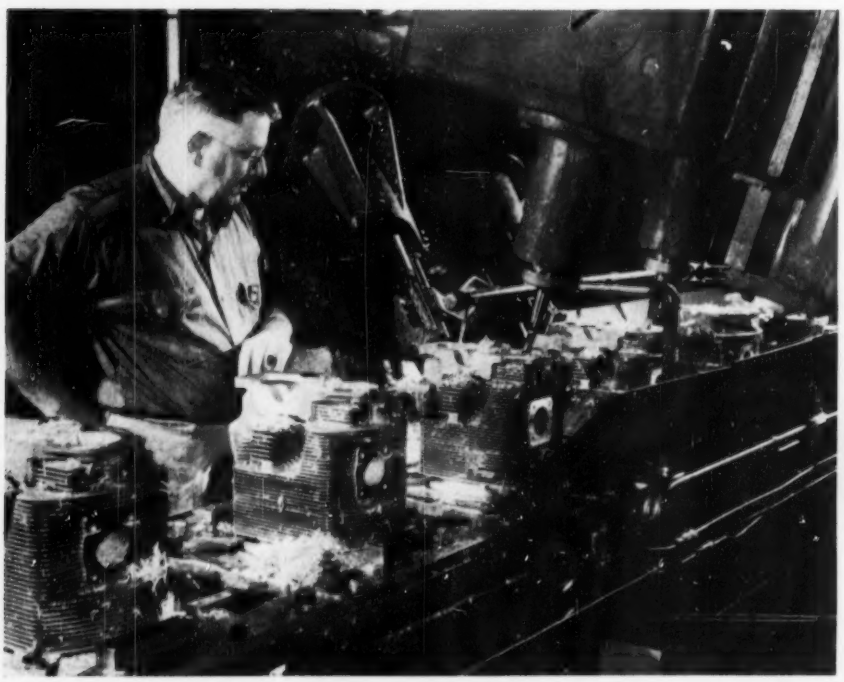
they call for special processing

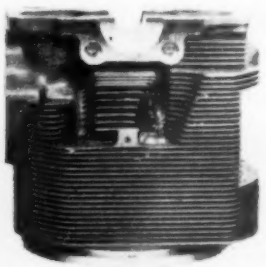
CYLINDER MUFFS ARE FINNED in a battery of 10 Fay automatic lathes. Some 10 lb of aluminum is turned off in 4 min by 39 tools facing the edges and cutting 37 slots. A special problem is involved in handling straight turnings at such speed. Conveyors and chutes carry the "hay" to the end of the machine row, where it is crushed for density in subsequent handling

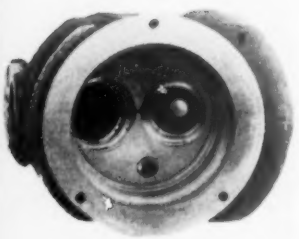


ROUGH CYLINDER HEADS are checked for leaks in this special machine. The head is submerged in water while two separate sources of air test the cylinder-head dome at 70 psi and the rocker area at 20 psi

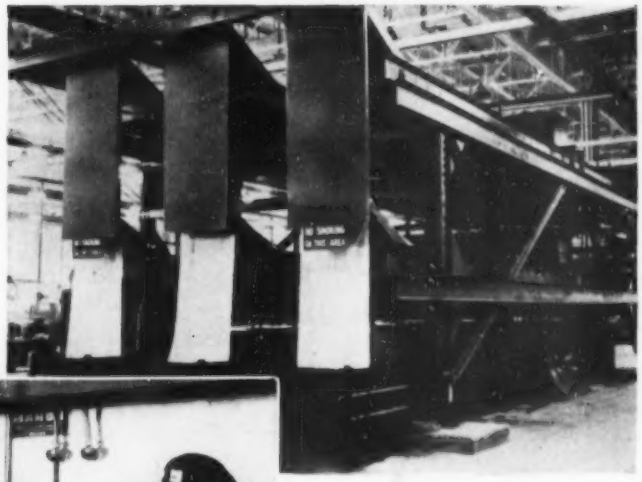
CYLINDER HEADS... transfer-machined, tricky assembly



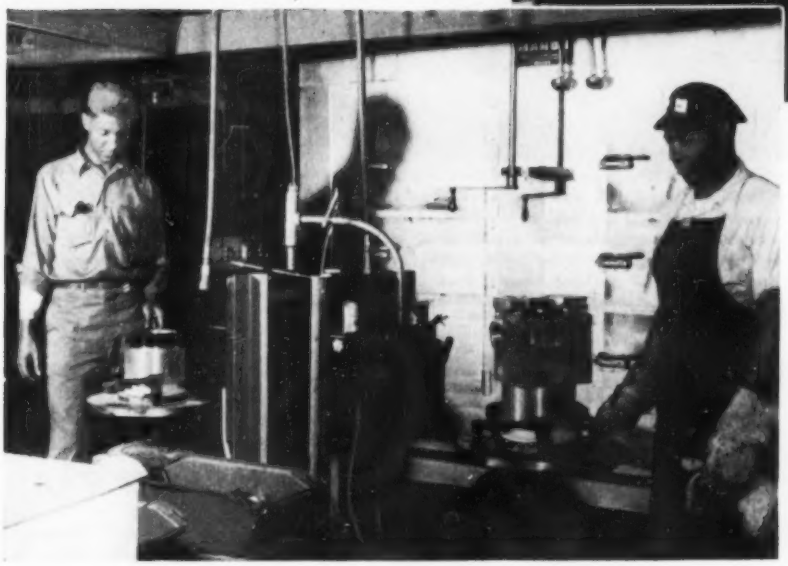




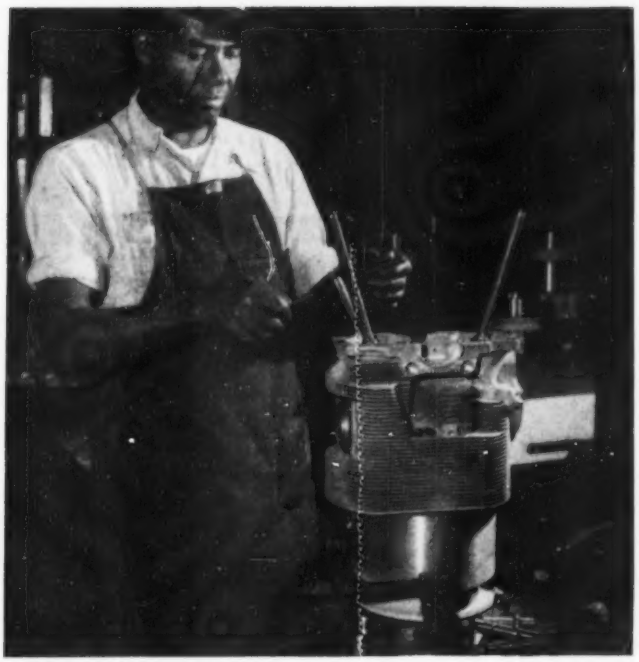
TWO GREENLEE TRANSFER MACHINES (one installed) each handles 143 operations on the aluminum cylinder head, finishing a head in 36 sec. This is the exit end of the machine already installed. It has 103 stations, 48 for machining, 55 for transfer. There are 143 machining spindles, doing drilling, reaming, chamfering, milling, boring, reaming, spotfacing, and tapping. The 182-ft machine weighs 242 tons. Coolant is filtered by system shown on the next page



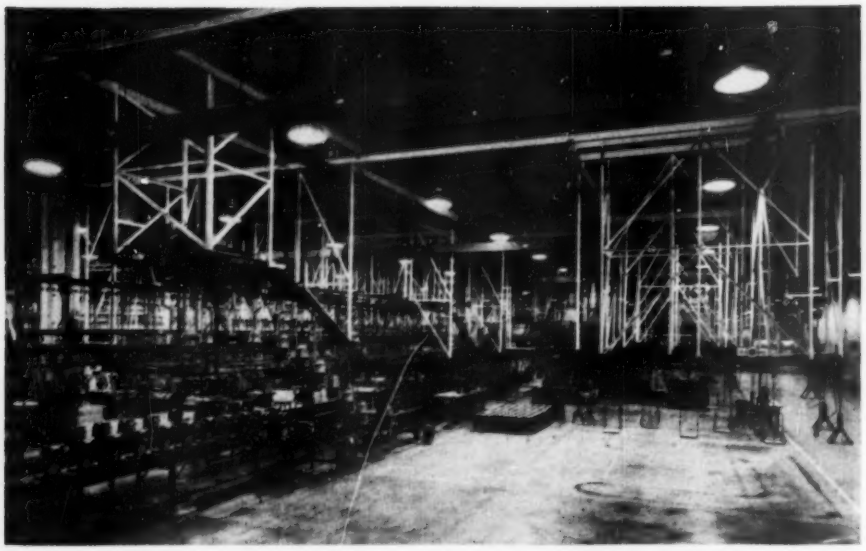
TRANSFER MACHINES are served by this Delpark filter. It has two compartments, one for each machine, and each about 20 x 20, handling coolant (kerosene and lard oil) at 800 gpm from the 11,000-gal system. Solids are filtered by flow through filter-material sheets on endless conveyors



CYLINDERS are multi-part assemblies produced by combined shrink and expansion fitting. The finish-machined aluminum-alloy head is placed in the 6-door Mahon oven at rear and heated to 600 F. The cylinder, at room temperature, is also taken from the conveyor at left rear, clamped by three lever clamps over its base collar on a turntable and rotated while a sealer is applied to the threaded upper sleeve, as at left. A pedal-controlled motor rotates the turntable. Then the heat-expanded head is placed over it by hand and spun down to seat on a shoulder

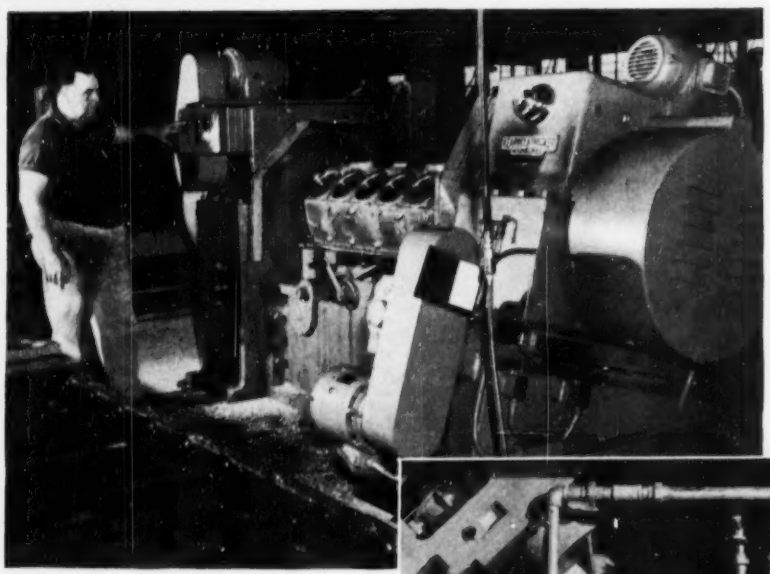


VALVE GUIDES and spark-plug inserts, of bronze, have meanwhile been placed, with installation bars, in a deep-freeze chest (right rear) to be cooled. These are withdrawn and immediately placed in the head as shown here, the installation bars serving to pilot longer inserts to prevent cocking and also to provide the weight for the gentle tap necessary to seat them firmly in the counterbore which the collar fits. This operation is done at high speed to utilize maximum temperature differential. The assembly is then cooled by air blast, checked with plug gages, and placed on the conveyor in background



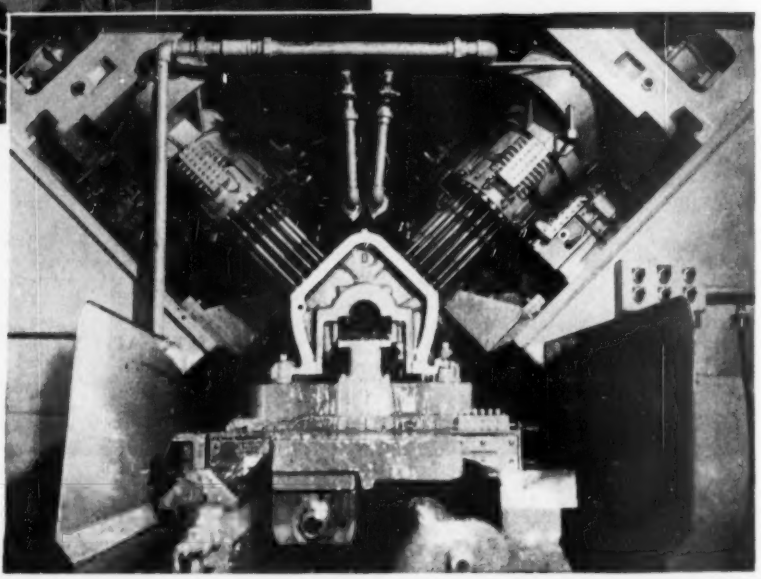
VALVE SEATS ARE GROUND with the cylinder assembly inverted and held in a yoke by the base. A Hall valve-seat grinder, centered on a pilot inserted separately through the valve guide, and carried on an adjustable overhead hanger, does the grinding. Coolant is supplied from twin jets through exhaust holes in the head

HERE, AT THE END of the cylinder-assembly line, can be seen the intricate network of conveyors, conduits and service piping required. Original 40-ft height of the plant for aircraft construction was brought down to 18 ft by steel grillage which supports service lines and overhead conveyors

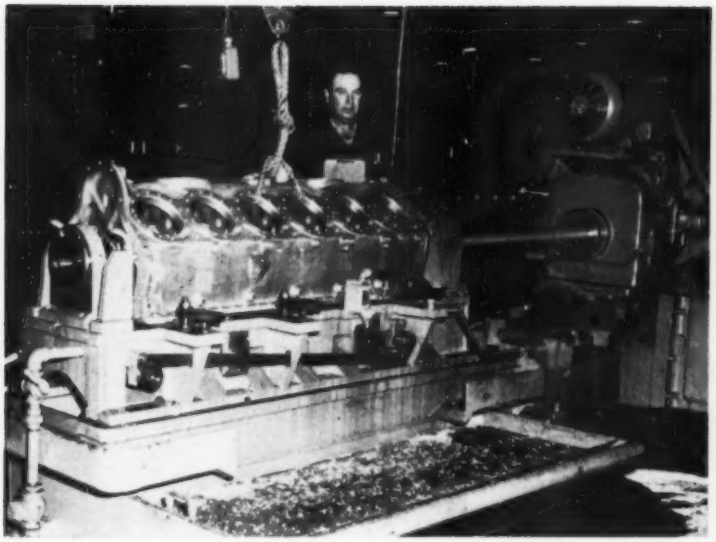


CRANKCASE

UNUSUAL is this double-end Kearney & Trecker planetary miller which finishes both ends of the rough-milled crankcase at once. On one end will go the accessory case and on the other a transmission adapter, both metal-to-metal joints without gaskets. Close tolerances for squareness, flatness, and finish are required. Cycle time is 56 seconds



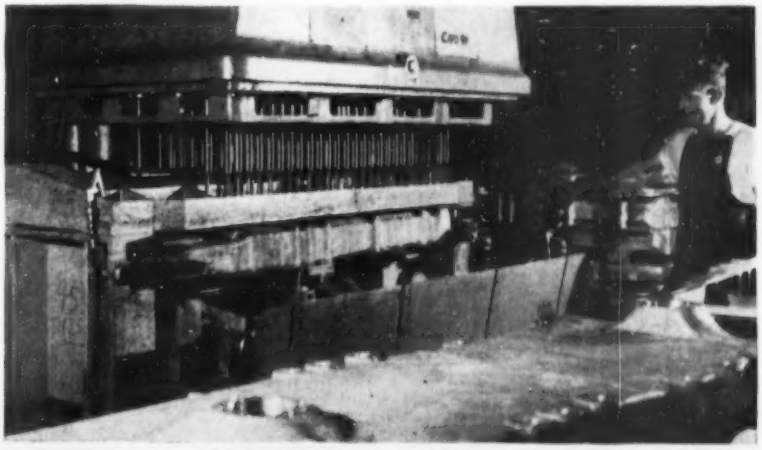
24 SPINDLES DRILL, counterbore and tap 144 holes in deck surface (for cylinder attachments) on the crankcase in this six-head Snyder way drill. The crankcase, held on a special fixture, is automatically indexed past the heads in six steps, requiring 2 min, 52 seconds



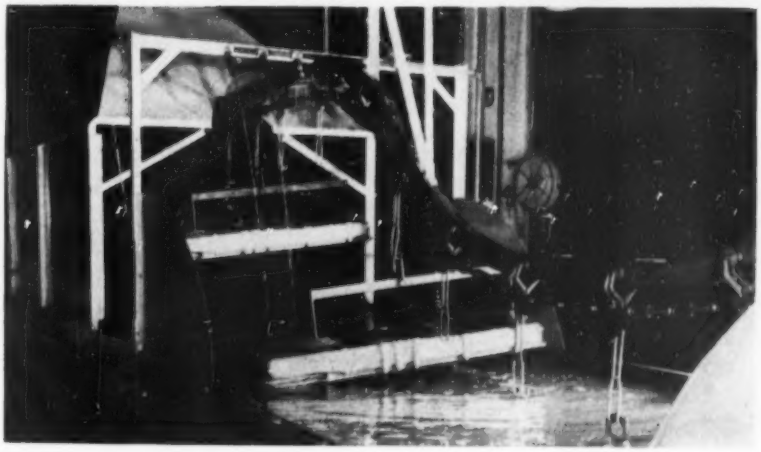
MAIN-BEARING STUD HOLES in the aluminum crankcase are roughed and finished in a special WF & John Barnes precision boring machine with outboard bar guides and an automatic cam-operated fixture. The heavy bar can hold tolerances of 0.0005 in. on diameter. The crankcase is carried right-side up for the operation. Finished bores are checked with a Precisionaire gage spanning three bearing surfaces at a time

TO FINISH INTERIOR SURFACES (bearing-cap sides and throughbolt-bore faces) of the aluminum crankcase to 0.002-in. tolerance, a special Colonial horizontal broach was developed. It machines all six surfaces in one stroke. Floor-to-floor time is 5 min. Note powered fixture

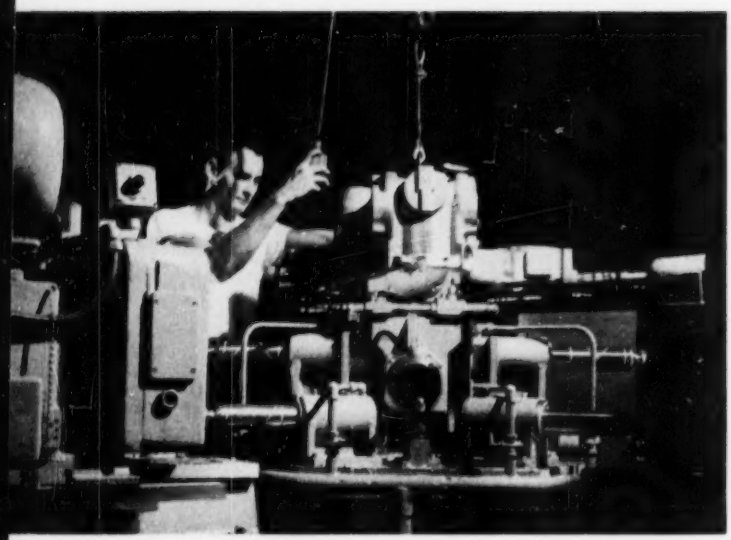
& OIL PAN... *take special machine tools*



OIL-PAN MACHINING begins in this Baush multiple drill. It produces 52 bolt and stud holes in the aluminum pan in a single down-feed of the head



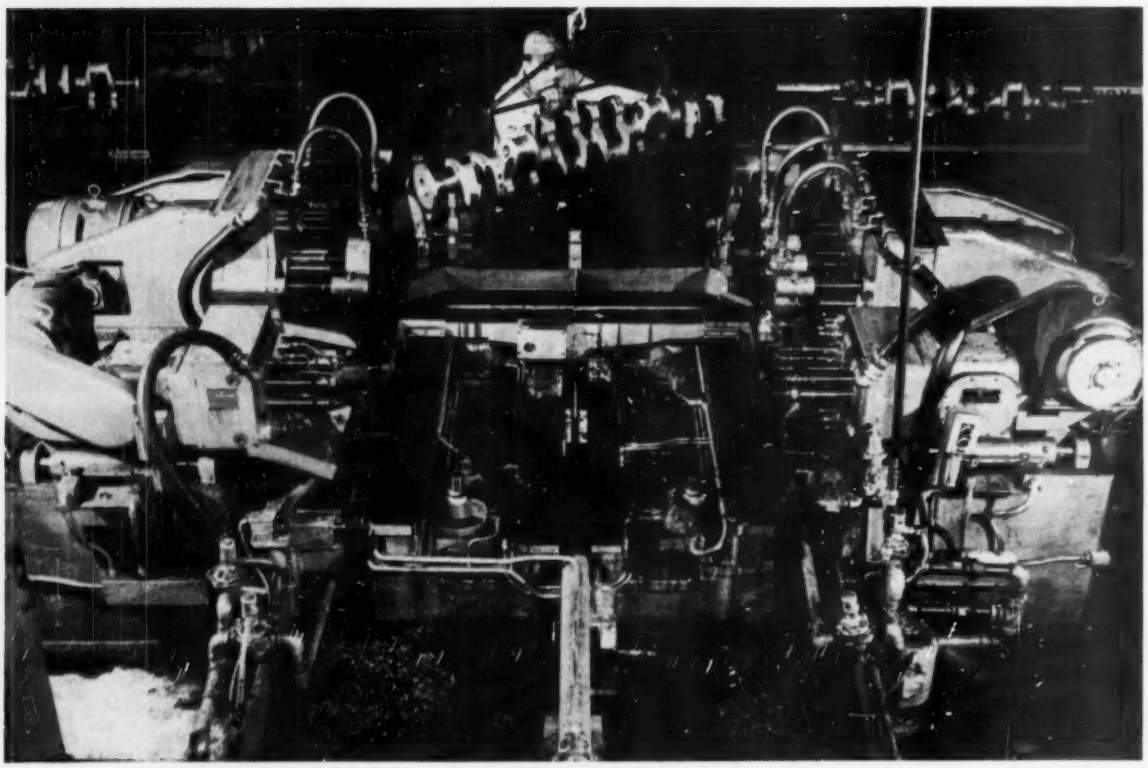
PAINTING OF ALUMINUM PARTS is eliminated by the automatic ACP Alodizing installation, a series of tanks about 100 ft long. Steps include: cleaning dip at 140 to 150 F for 3 to 4 min. (foreground), cold-water rinse at 60 to 80 F for 1 min, Alodine dip at 70 to 80 F for 3 or 4 min (background), cold-water rinse, hot-water rinse at 170 to 180 F for 2 min. Here an oil pan, on a special hanger, is leaving the cleaning bath. Cold-water sprays are at the top of the hump; the Alodine bath follows the sprays



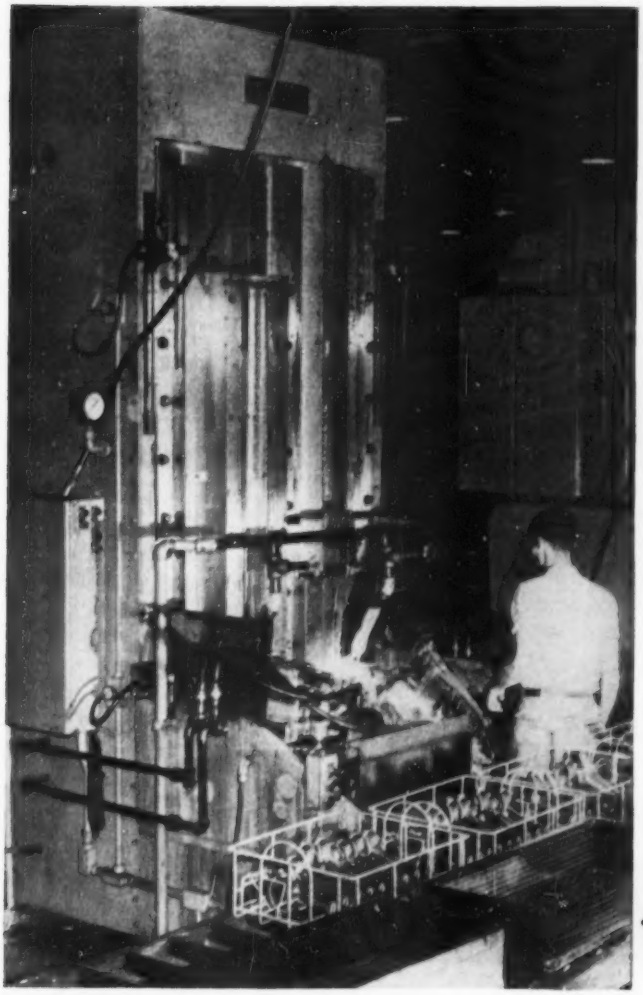
BEARING HOLES in the aluminum accessory case are drilled and reamed in this WF & John Barnes 2-way drill. The case lies face down in a central fixture

PISTONS are cam-ground to an elliptical shape on the skirt on Landis grinders. This machine grinds the camdrop to a tolerance within 0.0004 in.

SMALLER PARTS... made in quantity

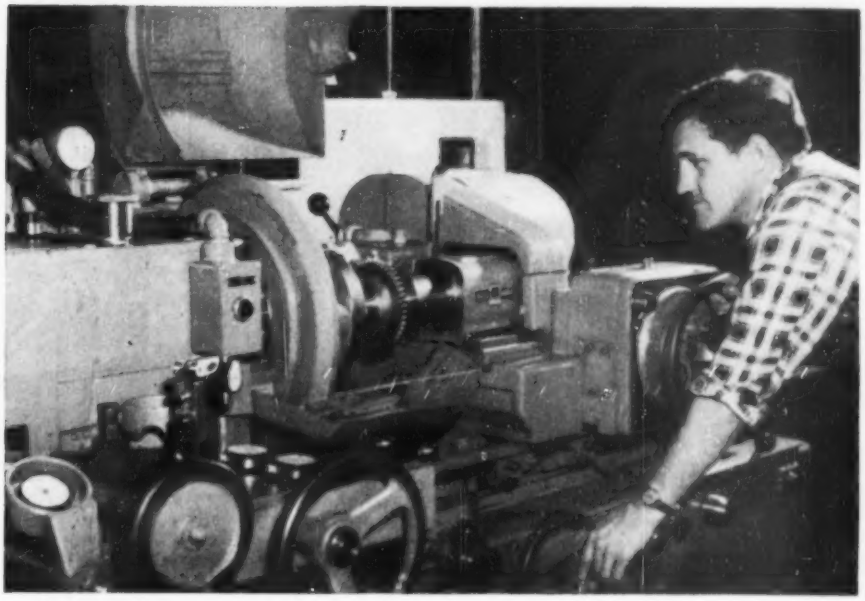


CRANKSHAFTS are drilled, reamed, chamfered and tapped on both ends in this special double-end LeMaire machine. Shafts are set in a sliding fixture, moved hydraulically to two stations where it is indexed positively by pins. Cycle time is 8 min per shaft



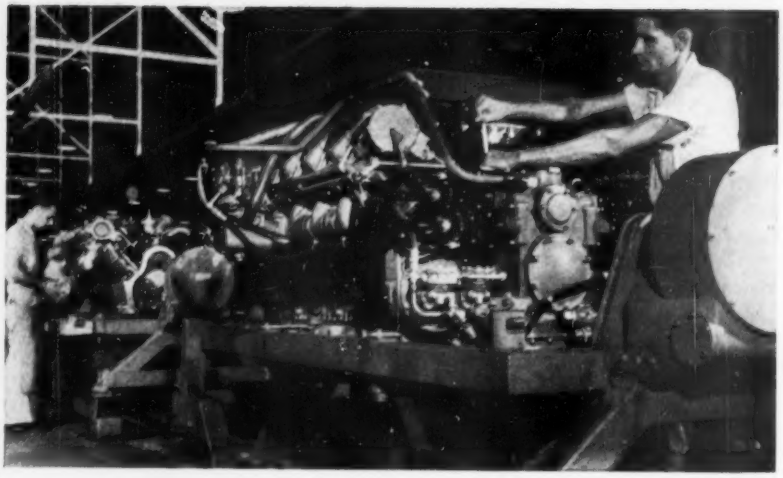
THE TANK ENGINE includes 54 gears; all to very close tolerances. Here, for example, is a Gleason bevel-gear cutter making a smaller gear. Cycle time is 5 minutes

CONNECTING-ROD "BIG-END" and cap faces are finished on a group of 2-slide LaPointe vertical broaches, with tilt-type fixture. One slide handles the joint face of the rod, the other joint face of the cap



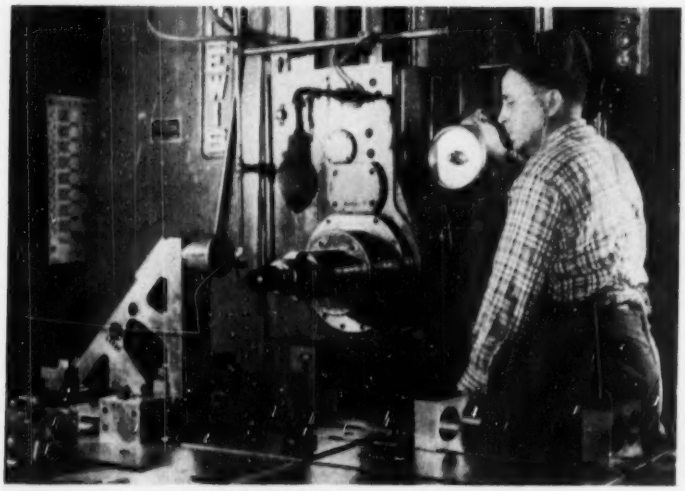
ONE GEAR, the accessory-driver-shaft gear, is particularly difficult because of requirements for 0.0002-in. concentricity between bore and teeth. To attain them, it is necessary to grind the bore on a Heald machine

ASSEMBLY & TEST



ENGINES ARE ASSEMBLED on trunnioned dollys carried along flat steel tracks by a sub-floor chain. Assembled engines are given a 2.75-hr test in adjoining test cells, then brought to this U-shaped tear-down-buildup line for partial disassembly, inspection, and reassembly. Parts removed are placed on shelves of wheeled steel cabinets running on a parallel line inside this one. After reassembly, the engine gets a final test run, then is ready for packing. During all this, it remains on the dolly

REGULAR TEST PROCEDURE includes a 2.75-hr "green" run, partial disassembly, inspection, and reassembly, then a final 2.75-hr run. Every 100th engine receives a 50-hr endurance test, partly at speeds in excess of design speeds. Occasionally, one receives an even longer test, as, for example, this one undergoing a 500-hr run endurance test. Each remote-control room serves two test cells, operators watching the engine through the center heavy glass panel. Instruments include oil-weight and carburetor-air-pressure manometers, oil-temp indicating controller, inclinometer (at top) which measures air per hour to each carburetor, throttle, chronotack, dynamometer control, pressure gages and potentiometer (temperatures of cylinders, fuel, air, etc)



TOOLING FOR PLANT MACHINES is produced and maintained in the South's largest toolroom. Here the operator is checking plug position on an angle bracket preparatory to putting on a large fixture. The machine is a Giddings & Lewis horizontal boring, drilling & milling machine

LARGEST INDUSTRIAL METALLURGICAL and chemical laboratories in the South are at Michoud, to handle both foundry and metal-working problems, from raw materials to gages and tools. This Pratt & Whitney measuring machine, used principally for checking gage accuracy, is a case in point. It can measure material up to 80 in. long to an accuracy within a few millionths

ROUND TABLE

Rusty

"I just had quite a talk, Al, with a fellow looking for a job. He used to be a toolmaker, but had been out of it for about ten years. He said he could pick it up again in a hurry. I didn't hire him, though. I figured the man had been away from his trade too long."

"Listen, Ed, you know as well as I do that a man who starts in again soon gets the feel and will be as good as ever. You just missed a valuable man by taking that attitude. Been away from his trade too long! Hell, man, it's just like swimming. Chuck a man in over his head after he has been away from the water for 50 years and you'll see the guy paddle his way out!"

"I don't think so, Al. In the first place, a man who has been out of touch with his trade for any length of time gets pretty rusty. What's more, this is a moving world; that guy has been out of contact with the improved machine tools and new methods of manufacture we know exist today. It would be like taking on a machine operator as a toolmaker—I'd have to train him all over again. I need toolmakers, Al, not has-beens. What's more, I want men who are interested in toolmaking; not guys who quit the trade. If he quit once, he's likely to quit again. If he had any real interest, he'd have stuck to it. You know that if you left the plant right now, then decided to come back in later years, you'd feel like an old grandmother and have to feel your way around."

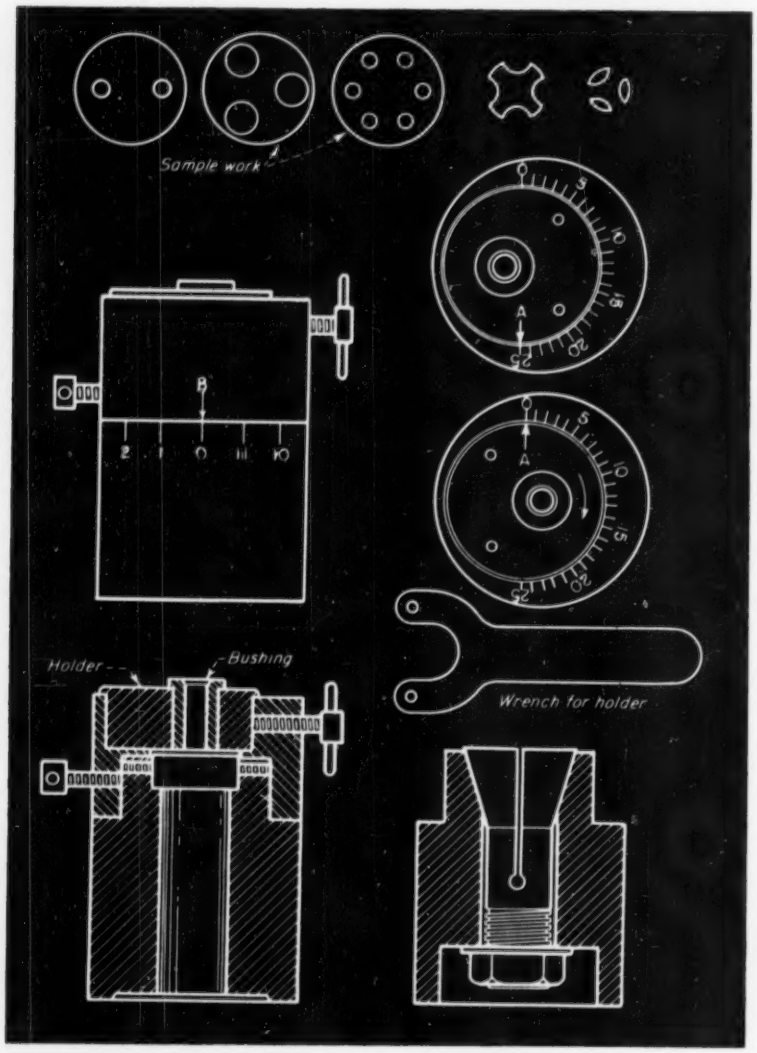
"Says you! My brains'll be just as keen ten years from now as they ever were. I'd much rather take on a good man from ten years ago than one of these jittery moderns who seems to know it all—and doesn't know anything when the chips are down."

"It's easy to see, Al, that you're getting old and won't admit it. I say that a man staying off his trade for any length of time results in deterioration in his know-how that should blackball him."

"I still say that, given a chance to nimble up his fingers, the man will turn out to be a better worker than his modern brother, and I think we should give him a job faster than we would a youngster."

DOES A man become rusty—too rusty—away from his trade? Your ideas and opinions on this subject will interest others. Discussions of earlier topics appear on later pages.

Practical Ideas



Self-Indexing Drill Jig

Designed originally for drilling the clearance holes in threading dies, we have found many other uses for this simply constructed jig. The top part of the body (rotating part) is bored ¼ in. or more, according to the job, out of center to receive the bushing holder as shown. After clamping the bushing holder in place with the clampscrew, an arrowhead is scribed to indicate the zero graduation on the top. Then, the entire assembly is centered in a lathe chuck and the drill-bushing hole is bored in the bushing holder. This hole will be in the jig center.

After placing a drill bushing into this hole and assembling the jig with a blank die in place, a hole is drilled in the center of the blank by using the bushing as a guide. If the rotating top is bored ¼ in. out of center, the bushing holder, when positioned with the arrow "A" pointing to 25, will locate the second hole drilled ½ in. out of center. Thus, the offset of each hole can be varied from 0 to ½ in. by graduating the holder from 0-25. The outside periphery is graduated in 12 divisions that permit 2, 3, 4, 6, and 12 equally spaced holes to be drilled around a circle having a radius determined by the offset of the bushing.

Starting with the arrow "B" on zero, the first hole is drilled. Then, shifting the arrow to the No. 4 and next the No. 8 positions will produce three equispaced holes. By using 0, 3, 6, and 9, four holes are equispaced.

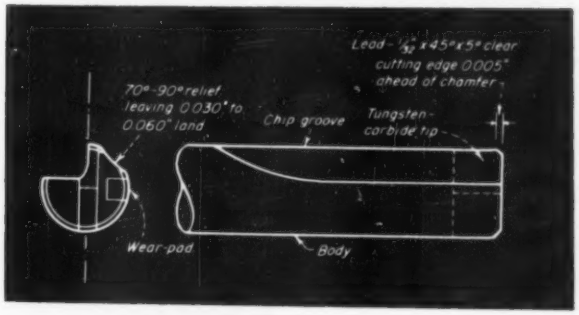
Headless socket setscrews are used to clamp the work in place. A clampscrew fastens the top to the base. Also, the base can be modified to use a draw-in collet for increased production.

By using endmills and hollowmills, this jig is useful for many kinds of work. For interrupted cuts, use a drill with the cutting end ground square with the shank. This tool will cut smoother than the pointed drill and side thrust is reduced. *Joe Magis-Frankart, Ciney, Belgium*

"JOY" Is A Joy for Drilling, Tapping Stainless

We are using "Joy", Procter and Gamble's dishwashing detergent, to drill and tap type 303 drop-forged stainless-steel forgings. For some undetermined reason, it has proved very successful in producing a clean hole and a minimum of galling. Also, tool life has been greatly increased. Perhaps the solution could be diluted, but we use it as it comes from the bottle; apply it from an oil can or with a brush. *Louis A VanGelder, Canandaigua, NY*

Ed. Note: Wonder if anyone else has been successful in using this material, and if it has been tried in the form of a spray, or aerosol, as in oil-mist cooling?



Gun Reamer Ups Tool Life Ten Times

Troublesome metals in our shop were gunmetal, lead bronze, phosphor bronze, meehanite, and monel. Few shops are happy to see these metals specified. Our problem was to obtain a good finish and close tolerances and our consumption of machine reamers was high.

When we changed to gun reaming on a gunmetal valve body, the effective life of a reamer jumped from 150 to 200 holes with a machine reamer to more than 2000 holes. The hole was 0.375 ± 0.00025 in. dia x 2¼ in. deep. Output increased and finish was better than previously. On a 0.750 +0.001/−0.0005-in.-dia hole the gun reamer is still going after 1400 holes in lead bronze, while the former tool life was 85 to 150 holes.

The tools were made from scrap HSS reamers, counterbores, and endmills, with the tips silver brazed into place at the lowest possible temperature to avoid softening the tool body. A superior finish resulted from the burnishing action of the gun-reamer bearing pads and the hole was perfectly round. Actually, roundness can be governed much more readily than with standard reamers.

Lower feeds and much higher speeds are used; usually about 0.005-0.012 ipr feed and the highest possible speed. Feed control is much more important than speed. The tools work well on second-grade machines as they are self-stabilizing. Floating holders may be used, along with a guide bushing for deep holes, if necessary.

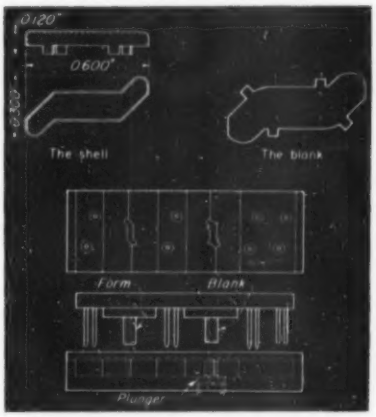
We made the reamers by grinding the OD to +0.010 in. over finish size, then cutting the chip groove and slotting for the tip. For economy, two tips were used on the larger sizes, while a solid tip was used under ⅝-in. dia. After silver brazing the tips in position, the portion of the tip in the chip groove is ground flush to prevent a gap in which chips could collect and score the bore. The OD is then ground to about 0.0002 in. under the size desired in the finished hole, allowing about 0.0005 in. per in. back-taper relief.

Next, the lead is ground with a 5° clearance angle on the 45° chamfer and the remainder of the chamfer is relieved 0.005 in. behind the cutting edge. This relief allows the tool to stabilize itself as soon as it has entered the hole 0.005 in., thus it is self-centering.

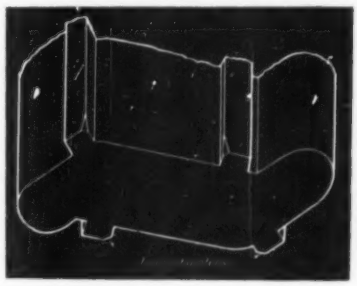
Usually, we allow 0.010 in. of metal for reaming a 0.300-in.-dia hole and 0.020 in. for a 1-in.-dia hole. Coolants should provide better lubricity than is required for machine reamers. Sulfurized mineral oil is satisfactory. *R. Doceff, Glenelg, South Australia*

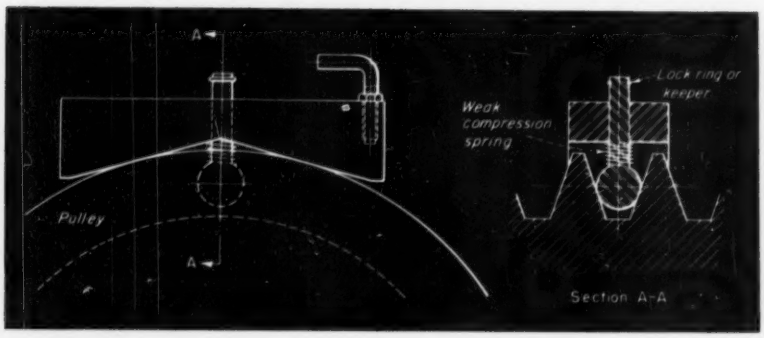
Improved Transfer Method

Large quantities of a stainless-steel shell had to be blanked and formed. The usual method of pushing the blank back into the strip would not work because of the extremely hard burrs produced in cutting the steel. Although these burrs were very small, they prevented the blank from reentering the strip. As no transfer press was available, I utilized another method, which I believe is new.



In the progressive die the blanking punch penetrates through the material into its corresponding die only a few thousandths of an inch. By doing so, it cuts the entire contour of the blank. To avoid cutting the blank completely out, thus permit it to be carried to the forming station, the punch was given four small chamfers. At these four points the blank is not severed and these four bits of material have sufficient strength to carry the blank but are still so fragile that the forming punch easily breaks them without distorting the strip which is held by pilots. *P Dryere, Mexico 5, DF*

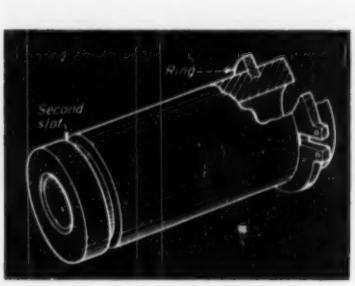




Sheave Groove Gage

To have full efficiency, V-belt pulleys must have all of their grooves evenly machined with respect to angle and width. When pulleys are turned on an engine lathe, with the compound set for a desired angle, all of the grooves are cut at the same setting, hence groove angles are the same. It is more difficult to maintain a constant width in each groove. A belt will run higher in a narrow groove than in a wide groove; will have a greater distance to travel around the driving circumference of the pulley. Thus, any variation will make the belts work against each other and will shorten their useful lives.

Groove widths can be compared with the gage shown. A shallow "V" is machined into one edge of the block and the plunger hole is drilled and reamed dead center. The ball end of the plunger is machined and polished, and the plunger shank is made a slip fit into the reamed hole in the block. A keeper snaps into the groove in the shank to prevent the plunger from falling out. The spring is just strong enough to assure positive contact between the ball and the groove sides. Screwed into the top of the block is the hook which serves as an indicator mount; it is somewhat adjustable. The indicator is mounted so that it is actuated by the end of the plunger. Actual gage dimensions are determined by the size range of grooves to be measured and the style of indicator to be used. *W Saling, Corpus Christi, Texas*

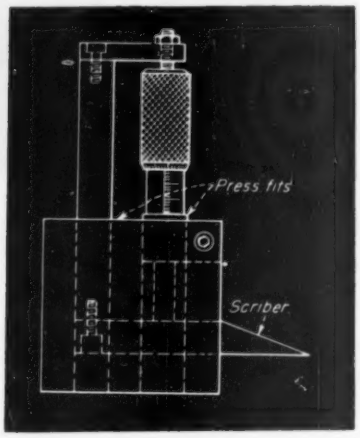


Bushing Life Doubled By Retainer Ring

Instead of using a flanged drill bushing, use a straight bushing and grind a slot at each end as shown. Place a retainer ring, or "snap ring," in the slot at one end to act as a flange. When the end of the bushing wears oversize, change the ring to the opposite end and reverse the bushing. Thus, you practically double the bushing life as well as provide bushings at less expense or effort. This is equally useful for guide bushings on diesets. *Ray Gentry, Anderson, Indiana*

Micrometer Scriber

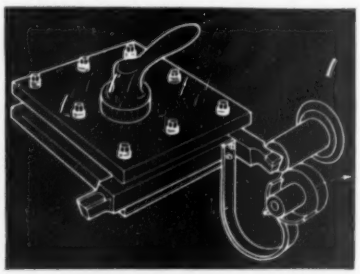
In laying out small work this device is very accurate and easy to read. A 1-in. micrometer barrel is set into a block and a scriber is attached to the micrometer as shown. By adjusting the screw and locknut at the top, the scriber is held against the bottom end of the micrometer spindle as the spindle is moved up or down. While the scriber has an adjustable scale of only 0 to 1 in., a set of 1-2-3 blocks provides any combination from 0 to 7 in. *Ottavio Cerullo, East Boston, Mass*

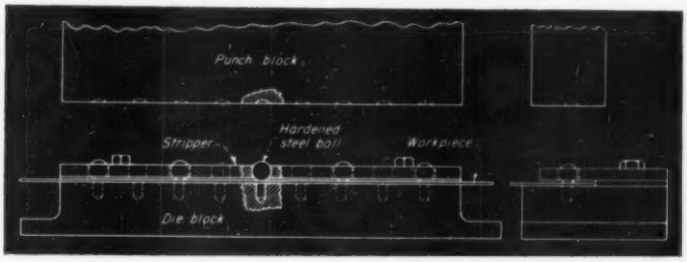


Spring Flips Cut-Off Parts

Digging small parts out of the chip pan of a lathe or a turret lathe is eliminated by placing a spring beside the cutoff tool on the cross-slide as shown. The spring is pressed backward as the tool advances and the work bears against it. Then as the work is severed from the bar the spring throws it forward into a tote box.

A flat spring is used and a light metal "U" is riveted to it, to give the work some direction as it flies. The spring can be screwed to a small block of metal clamped in the turret, can be fastened to the turret, or attached to the rear end of the other tool as shown. It provides a simple and effective way to automatically unload the work. *Frank M Butrick, Jr, Alma, Mich*





Welding Projections Formed By Simple Ball Die

Many sheetmetal parts to be spot-welded require welding projections or "buttons" to assure satisfactory welds. As the positioning of these projections varies with each size and style of product, the die shown is designed to permit rapid changes from one spacing to another.

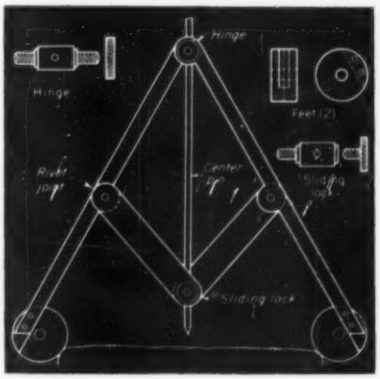
The hardened die block is provided with a series of holes spaced to provide the usual requirements. A stripper and a backstop are attached to the die block, the stripper having a series of holes corresponding to those in the die block and aligned with them. In the stripper, the holes are larger than the die-block holes so that a hardened commercial steel ball can be dropped into each hole with sufficient clearance to allow the ball to rest on the workpiece. A series of shallow spherical depressions in the punch block are aligned with the die block holes. These depressions are formed before the punch block is hardened by placing the balls in position and then striking them with the punch block.

The die is shown set up for forming five equally spaced projections. When a change is required, the balls are lifted out of the stripper with a magnet and repositioned. Thus, all of the required spacings are accomplished in a few seconds, without ever removing the punch or die from the press. An incidental advantage of this tool is that the material bends slightly away from the projection side, hence when the piece is clamped to its mating part there is sufficient pressure to prevent bulging between welds. *L Kasper, Philadelphia, Pa*

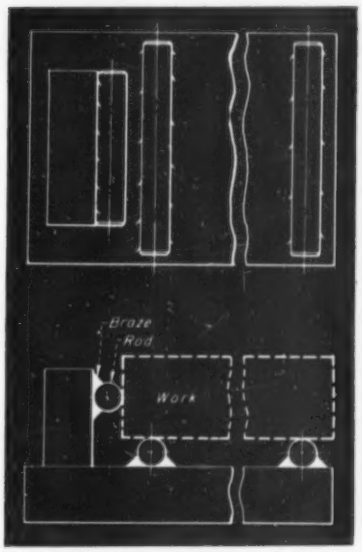
Special Divider Locates Work Centerline

Much of our work is on aircraft parts which are contour-formed after machining. As stock must be left at each end for the stretch-forming jaws, layout is from the centerline. Tired of struggling with a steel rule to locate each center, I built the device shown.

The divider legs are ⅛ in. thick x ⅜ in. wide, ground from ⅝-in.-wide flat, ground stock (not hardened) and are hinged at the top. The same stock is used for the crossarms, which are hinged to the legs with pins or rivets and joined together with the sliding lock. For the feet, two pieces of 1-in.-dia x ¼-in.-thick drillrod are used. These pieces are clamped together and a ¼-in.-wide slot is machined between the two about ⅜ in. deep, to provide a ⅛-in.-wide shoulder on each piece. Next, the holes are drilled and tapped. Then the pieces are separated, hardened, reclamped together, and finish ground. Next, they are pinned and screwed to the legs. (By clamping all of the similar parts together for machining, inaccuracies are avoided.) The center, pin is ⅛-in.-dia drillrod, hardened and pointed by machine grinding.



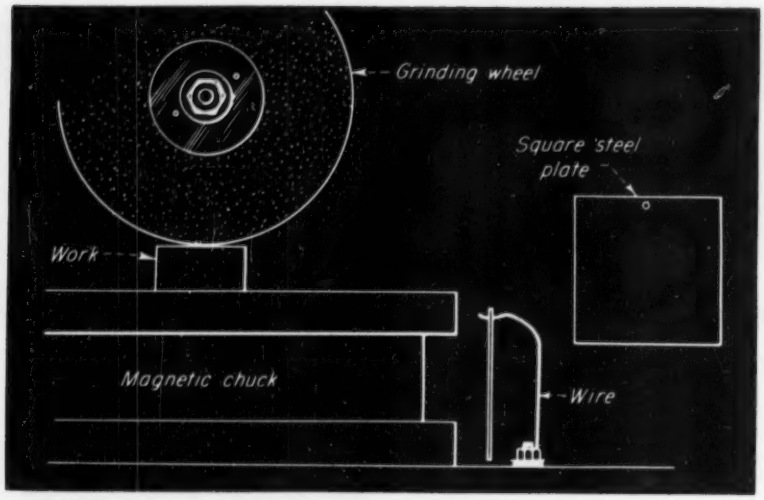
The dimensions given are simply for guidance. Dividers may be built in any size, to the point of clumsiness, and details should be in proportion. *Oscar F Lambert, Columbus, Ohio*



Rods Good Support For Rough Work

On welding jigs and similar tools where extreme accuracy is not essential, CRS rods are efficient and economical as rest pads and stops. Pieces of rod are cut to the desired length, clamped to the fixture at the proper location, and tack-brazed in place.

This method is especially useful for short run jobs where tooling costs must be held to a minimum. Providing only line contact with the work, these rest pads are very satisfactory on rough, uneven work. Also, the pads are less likely to accumlate chips and dirt. For some, more accurate, fixtures, drillrod can be used and ground flush after brazing. *Roger Isetts. Kenosha, Wis*



Safety Device For Magnetic Chuck

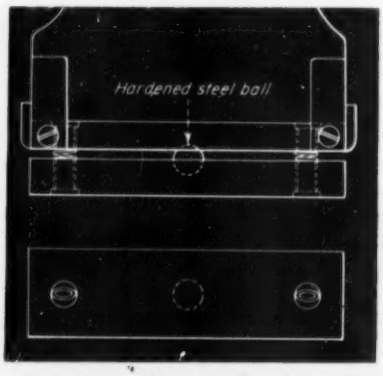
To prevent grinding wheel breakage and reduce the danger of having work thrown off the chuck when the power is accidentally turned off, we built the indicator shown. It consists of a piece of ¼-in.-thick steel plate about 3 or 4 in. square, a piece of heavy wire formed into a hook, and a small bolt to hold the wire in place. The steel square must emit a ringing sound when struck, hence it is best hardened. A hole is drilled near the top edge of this steel plate so that it will hang loosely on the wire, as shown. The wire is positioned to place the plate at the end of, and below the top surface of, the chuck so that it swings between the chuck and the bolt.

When the chuck is on, the piece of steel will remain in contact with the chuck, but the instant the chuck goes off the plate will swing between the chuck and the bolt with each stroke of the grinder and emit the ringing alarm. *George R Cook, Independence, Mo*

Self-Adjusting Vise Jaw

This flexible jaw is kept in place on the vise by the two cap plates which hook over the ends of the stationary vise jaw. It affects the vise only in decreasing the overall opening by the amount of the jaw thickness. This extra jaw is self-adjusting for holding pieces that are not parallel on their clamping surfaces. Working to its capacity extent in all directions, the flexible jaw is more effective in its holding power as at least two points on the work contact the jaws and these are further apart than are parallel jaw surfaces. Thus, the vise screw has a greater grip.

Without this jaw, when there is only one point of contact in the standard vise, the screw must be made very tight, otherwise the work will readily rotate on the single point. In some cases, it is difficult to get enough pressure to prevent the piece from rocking while it is being worked. *Martin H Ball, Watervliet, NY*



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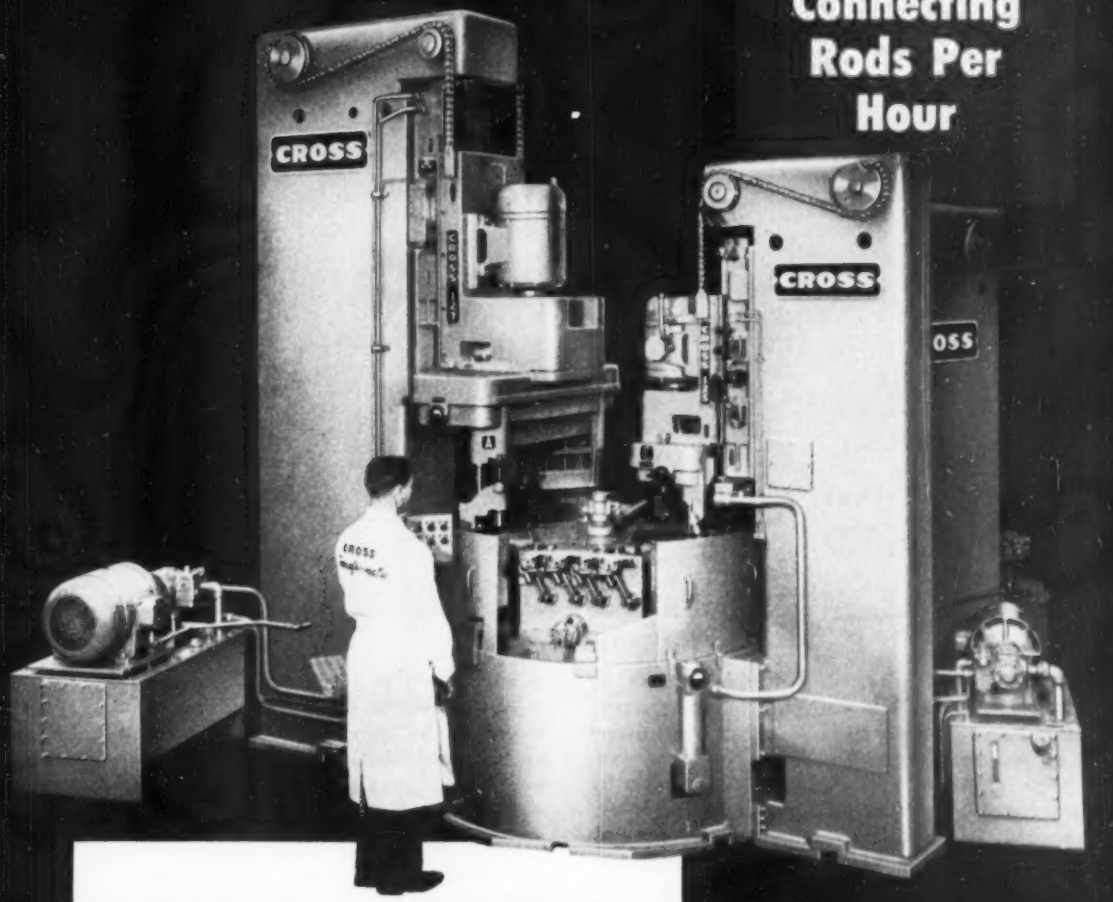

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Temperature for Shrink Fits

By TYLER HICKS

This chart permits fast estimates of the temperature needed to expand a metal ring or member having a cylindrical hole a given amount before making shrink fits. It is based on the physical dimensions of the hole, the linear coefficient of expansion of the material and the number of thousandths of an inch expansion desired. Use it like this:

EXAMPLE: To what temperature should a cast-iron bracket be heated to obtain 0.003-in. expansion in a 6-in.-dia hole in the bracket?

SOLUTION: Enter the chart on the left at 0.003-in. expansion and draw a straight line through a hole diameter of 6 in. on the right. Then from the point labeled "cast iron" on the top scale of the chart draw a straight line through the intersection of the first line with the pivot line. At the bottom of the chart read the temperature needed as 85 F, closely.

You'll find this chart a big help on all shrink-fit jobs because it has been set up for common materials. By applying chart results you eliminate the danger of overheating a part. Excessive heating can cause metallurgical changes in some materials. Also, heating time is reduced because you know exactly what temperature is required. Where reading is beyond the range of the temperature scale, solve as above, using 0.001-in. expansion and multiply the temperature found by the number of thousandths expansion desired.

This chart is based on the physical relation:

$$T = N/KD$$

where

- T = temperature rise F, *above* room temperature, needed to expand piece N thousandths
- N = number of thousands of an inch expansion desired, expressed as a decimal
- K = linear coefficient of expansion of the metal
- D = hole dia, in.

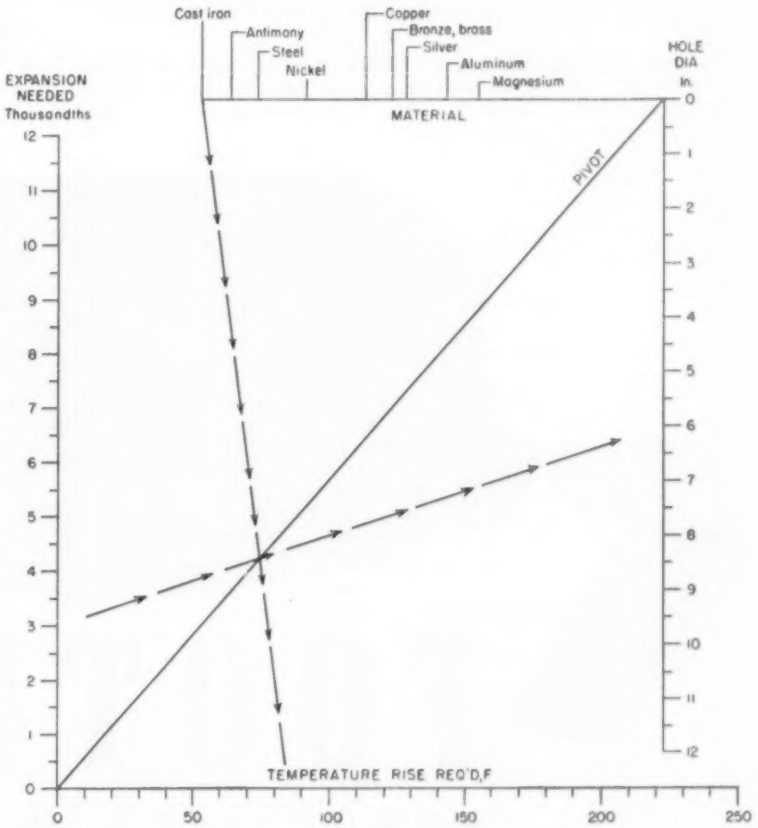
Note that temperature change needed, T, is deg F *above* room temperature.

Coefficients of expansion used are:

Cast iron, 0.0000059 in. per deg F
Antimony, 0.0000063
Steel and wrought iron, 0.0000059
Nickel, 0.0000076
Copper, 0.0000091
Bronze, brass, 0.0000101
Silver, 0.0000105
Aluminum, 0.0000128
Magnesium, 0.0000143

For the example:

$$T = \frac{0.003}{0.0000059\ (6)} = \frac{0.003}{0.0000354} = \frac{30{,}000}{354} = 84.8\ \text{F}$$



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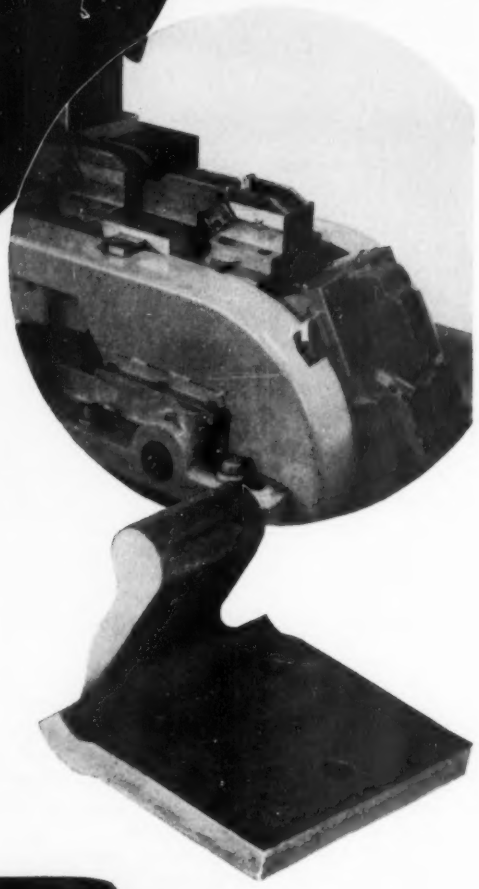

• In many plants where large quantities of duplicate metal parts are being machined substantial savings are being made through the adoption of surface broaching. Production is exceptionally high, close tolerances are maintained, and tool maintenance costs are much lower than with ordinary methods. Foote-Burt engineers, pioneers in this advanced machining method, have had a wide experience in applying surface broaching in many fields.

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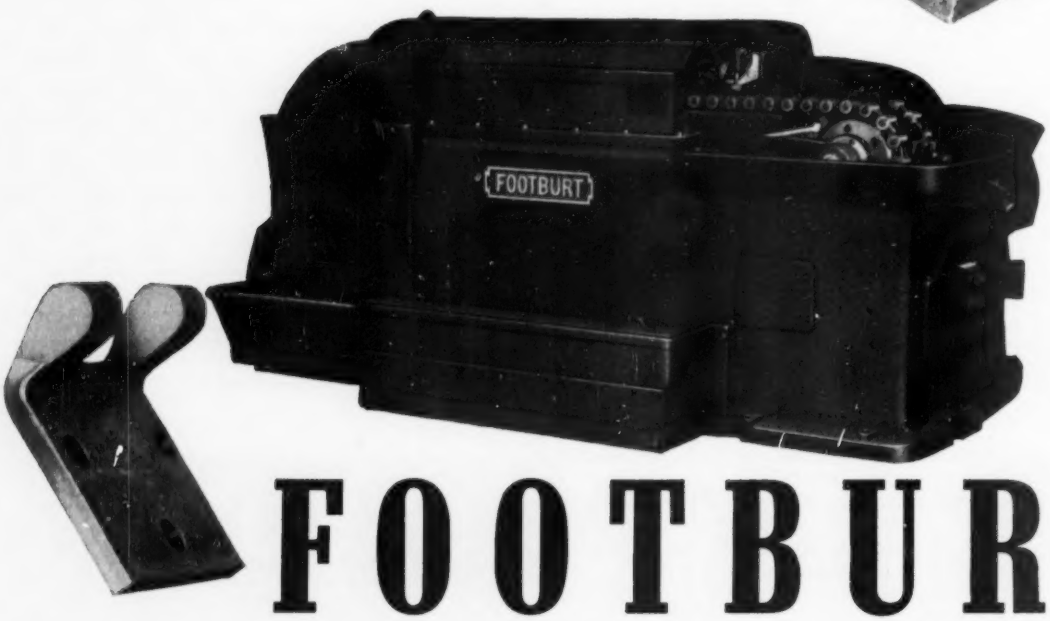
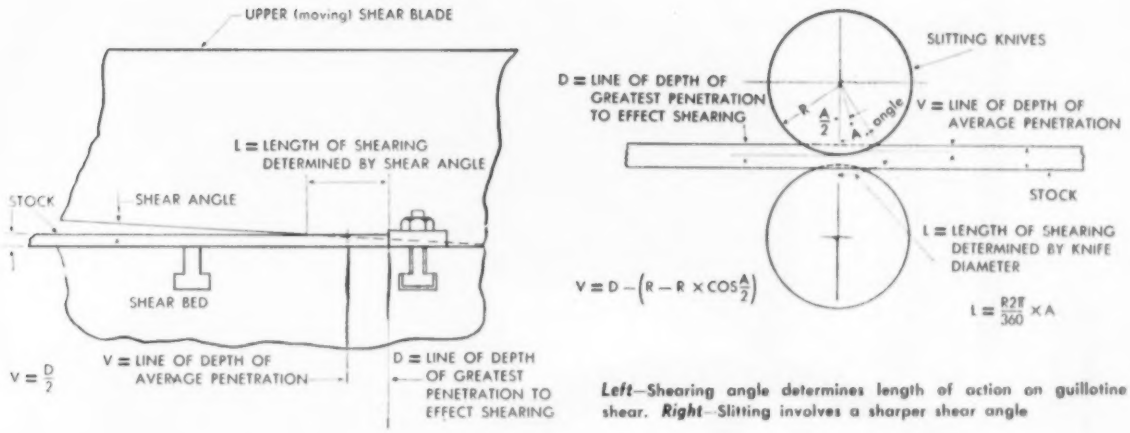


FOOTBURT

PRODUCTION MACHINE TOOLS

Forming Aluminum Sheet and Plate...I

BY E V SHARPNACK, JR.
Chief Forming Engineer
Reynolds Metals Co, Louisville


UPPER (moving) SHEAR BLADE
L = LENGTH OF SHEARING DETERMINED BY SHEAR ANGLE
STOCK
SHEAR ANGLE
SHEAR BED
V = D/2
V = LINE OF DEPTH OF AVERAGE PENETRATION
D = LINE OF DEPTH OF GREATEST PENETRATION TO EFFECT SHEARING
SLITTING KNIVES
D = LINE OF DEPTH OF GREATEST PENETRATION TO EFFECT SHEARING
V = LINE OF DEPTH OF AVERAGE PENETRATION
R
A/2
A = angle
STOCK
L = LENGTH OF SHEARING DETERMINED BY KNIFE DIAMETER
V = D − (R − R × COS A/2)
L = 2πR/360 × A

Left—**Shearing angle determines length of action on guillotine shear.** ***Right***—**Slitting involves a sharper shear angle**

SHEARING AND SLITTING

Aluminum alloys are sheared and slit by conventional methods. With guillotine shearing, however, the hold-down pads should be faced with rubber or other shock-absorbing material, in order to avoid marking the stock. Heavy cotton flannel shellacked to the shear bed and feed tables will minimize scratching of the work.

Shearing energy in inch-tons equals $L \times t \times V \times S$ / 2000, where L is the length of the cutting edge in in.; t is the material thickness, in.; V is the penetration to effect shearing, in., and S is the ultimate shear strength of the material, psi. (table).

Closer clearances are required between guillotine shear blades for "O" (annealed) material than for tempered and heat-treated metal. Slitter knives should have a clearance of 0.0015 in. for all alloys.

BLANKING AND PIERCING

Blanking of aluminum sheet is comparable to blanking of other metals, with the exception of the punch and die clearances. These can be related to shear strength of a particular alloy. See blanking-tool clearances listed below and the table of mechanical properties of various alloys (page 167).

Blanking punches should be made of annealed tool steel and dies of hardened tool steel. Surfaces of both members should be ground. Press loading may be reduced by grinding shear on the punch or die. Put shear on the punch if material being blanked must be kept flat.

With flat dies and punches, the maximum blanking pressure in tons equals $L \times t \times S$ / 2000, where L is the length of the cutting edge in in.; t is the material thickness, in.; and S is the ultimate shear strength, psi. If shear is provided, the blanking pressure in tons is

$$\text{Pressure} = \frac{L \times t \times S}{2000} \times t \div (t + Sh)$$

where Sh = Shear, in.

Clearances for piercing or perforating should be kept to an absolute minimum. Suggested die size is the punch size plus 5% of the metal thickness. Die relief should be at least ¾ deg. for quick "get-away" of slugs. Smooth sheared edges of small holes, similar to a reamed hole, can be obtained by pre-piercing slightly undersize and then shaving to the required size, using shear on the punch.

Shearing edges of blanking tools should be kept well lubricated, as well as the metal itself. The metal may be fed through felt rollers or pads well saturated with the lubricant.

Required stripping pressure is generally considered to be approximately one-eighth of the maximum blanking pressure.

BLANKING-TOOL CLEARANCES

Shear Strength psi	Die Size
Up to 10,000	Punch Size + .12t
10,000 to 12,000	Punch Size + .13t
12,000 to 15,000	Punch Size + .14t
15,000 to 18,000	Punch Size + .15t
18,000 to 24,000	Punch Size + .16t
24,000 to 30,000	Punch Size + .17t
30,000 and Up	Punch Size + .18t

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411 W. ONTARIO ST. • CHICAGO 10

DRILLS • REAMERS • COUNTERSINKS • COUNTERBORES • CARBIDE TOOLS • SPECIAL TOOLS

Forming Aluminum Sheet and Plate...II

Typical necked aluminum part

NECKING

Tops, or open ends, of drawn shells can be reduced by necking. The metal is stressed entirely in compression, and only a limited amount of reduction in diameter can be accomplished in one operation. The percentage of reduction is determined by metal characteristics before necking. Case records indicate that these data will serve as a guide:

Temper Before Necking	Reduction in Dia
H12 or H32	12-15%
O	9-12%
H14, H34, T4	6-9%

Necking angle should not exceed 35°. After necking, the wall thickness is determined by $t\sqrt{D/d}$, where t is wall thickness before necking, D is mean dia of shell before necking, and d is mean dia of shell after necking.

Working pressure in tons to neck a shell is

$$T = \frac{t \times S\ (D - d)}{\cos \text{necking angle}} \div 2000$$

where t is thickness of metal after necking, S is ultimate compressive strength, psi; D is mean dia before necking and d is mean dia after necking.

(1) FORMING AND MECHANICAL PROPERTIES OF ALUMINUM ALLOYS

Alloy[4] & Temper[2]	Forming[3] Classification	Shear Strength PSI	Yield Strength PSI	Ultimate Tensile Strength PSI	Elongation Percent
2S-O	Class I	9500	5000	13000	35
3S-O	Class I	11000	6000	16000	30
4S-O	Class III	16000	10000	26000	20
C50S-O	Class I	14000	8000	20000	28
52S-O	Class II	18000	13000	28000	25
61S-O	Class II	12500	8000	18000	22
24S-O	Class II	18000	11000	27000	19
R301-O	Class II	18000	10000	25000	21
75S-O	Class IV	22000	15000	33000	17
2S-H12	Class I	10000	14000	15500	12
3S-H12	Class I	12000	17000	19000	10
4S-H32	Class IV	17000	22000	31000	10
C50S-H32	Class II	16000	20500	24500	10
52S-H32	Class III	20000	27000	34000	12
2S-H14	Class I	11000	16000	18000	9
3S-H14	Class II	14000	20000	22000	8
4S-H34	Class IV	18000	27000	34000	9
C50S-H34	Class II	17000	24000	27500	9
52S-H34	Class III	21000	31000	37000	10
2S-H16	Class I	12000	19000	21000	6
3S-H16	Class II	15000	24000	26000	5
4S-H36	Class IV	20000	31000	37000	5
C50S-H36	Class II	18000	26000	29000	8
52S-H36	Class III	23000	34000	39000	8
61S-T4	Class II	24000	21000	35000	22
2S-H18	Class I	13000	22000	24000	5
3S-H18	Class II	16000	27000	29000	4
4S-H38	Class IV	21000	34000	40000	5
C50S-H38	Class II	19000	29000	31500	7
52S-H38	Class III	24000	36000	41000	7
61S-T6	Class II	30000	40000	45000	12
R301-T3	Class III	37000	40000	63000	20
24S-T3	Class I	41000	50000	70000	16
75S-T6	Class II	49000	72000	82000	11
R301-T6	Class I	41000	60000	68000	11

NOTES:

[1] All mechanical properties and elongation values are typical. Elongation values are based on 2" gauge length on 1/16" thick specimens.

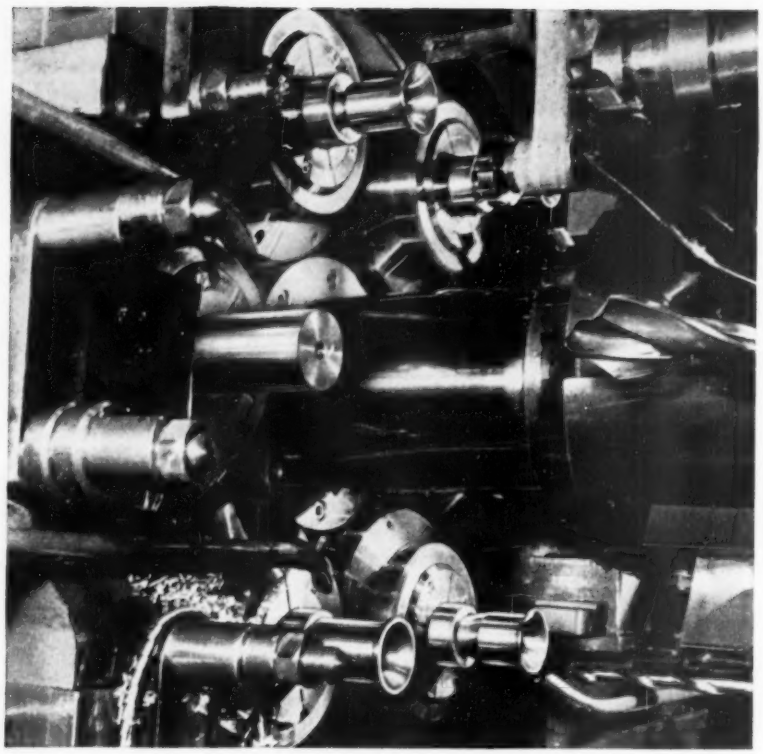
[2] Mechanical properties of "F" tempers are not guaranteed therefore these are intentionally omitted.

[3] Class I rated material has best formability in its respective temper group, Class II is next best, etc.

[4] Alclad (clad) alloys are not listed. If considered, use the same "forming classification" as shown for the bare alloys having the same alloy symbol. Mechanical properties of Alclad alloys are slightly less than those of the same bare alloy. Elongation values are approximately the same.

Insure Good Machinability

when you select Stainless Bars



Six operations on a Conomatic produce a beverage-filler centering bell of Armco 12 FM, ready for buffing.

It's not enough to specify an analysis of stainless steel bar stock that will meet corrosive conditions and hardness requirements alone. Consider the machining requirements too. If you have a production job you can reduce machining costs by specifying one of the Armco FM (free-machining) stainless steels.

THE FREE-MACHINING TYPES

Armco produces these free-machining types of stainless steel:

Trade Name	Type	Corresponding Basic Type
Armco 18-8 FM Armco 18-8 FM Se	303 303 Se	302
Armco 18-12 Mo FM	316F	316
Armco 18-10 Cb-Ta FM	347F	347
Armco 12 FM Armco 12 FM Se	416 416 Se	410
Armco 13-C-35 FM Armco 13-C-35 FM Se	420F 420F Se	420
Armco 17 FM Armco 17 FM Se	430F 430F Se	430
Armco 17-C-100 FM Armco 17-C-100 FM Se	440F 440F Se	440

(Those grades with Se symbol and Types 316F and 347F have a selenium and phosphorus addition; the others contain added sulfur).

NO CHANGE IN PROPERTIES

The FM grades have essentially the same mechanical properties and corrosion-resistance as their basic companion grades. This means they are generally interchangeable.

BOTH SE AND S

There are two types of free-machining stainless steels, one with a selenium and phosphorus addition, the other with a sulfur addition. Although each alloy has its particular advantages, the sulfur type costs less and is available. The selenium type is under Government allocation and its use is restricted.

For more information on the Armco FM stainless steels, get in touch with our nearest sales office, or write us at the address below.

ARMCO STEEL CORPORATION

2453 Curtis St., Middletown, O. Export: The Armco International Corporation

ARMCO

TALKING SHOP

Wee Shop

SMALLEST METALWORKING SHOP in Worcester, Mass, is the two-man Up-To-Date Tool Co. Julius Michaelson operates it in his cellar at 17 Mattson Ave, makes the "True Point" drill sharpener, a hand device that sharpens small drills against an oilstone. Mr Michaelson is a Latvian by birth, came to the US in 1904, retired in 1946 from Pratt & Whitney Tool after 5 years there. He'd previously been a tool designer at Norton. His sharpener came out of conversation with a patent attorney working on the Norden bombsight during WW II, who had trouble drilling small holes straight. The shop makes most parts of the sharpener on special machines built during the last seven years, contracts for special parts outside.

Carbide Damper

DODGE IS NOW USING boring quills which incorporate a damper for self-excited vibration. The "root" of the quill is carbide for added stiffness. The damper, described originally in *AM* (May 6, '48) has thus far been used only in steel quills. Technical design data on it are included in a paper by Dr R S Hahn of Heald Machine, *Trans ASME*, Vol 73, p 331, April, 1951.

Gnat's-Hair Movement

WHEELHEAD MOVEMENT on the new Brown & Sharpe universal grinder can be controlled to half a "tenth" by a new fluid motor built into the machine. So precisely is this made that it will feed the head in or out in half-tenth increments without measurable error. If the motor were to run continuously, this would be the equivalent of 2 rpm.

Another innovation on this machine is the application of Teleflex controls for the hydraulic valves—believed to be the first industrial application. These controls are, in effect, flexible racks enclosed in copper tubes which can be bent around corners. Movement of the control lever pushes or pulls the rack which is meshed with a pinion on the valve stem.

Off-Center Center

A LATHE CENTER NIB (Kennametal CN-140), modified to 74° included angle, is being used by a Midwestern company to flare stainless tubes of ¼ to ¾ in. dia. Flaring is 11/32 to 25/32 in., depending on size. The center, in a Leonard Tube Master, revolves at 1400 rpm and is fed into the tube clamped in a die. The center runs off center. Thus far, 74,000 ends have been flared with finish superior to that obtained formerly with HSS tools, which could only produce 1000 ends before failure from roughening.

Trepan to Suit

LARGE CAST-IRON HOUSINGS for one electrical line are made in a variety of sizes and shapes. To reduce complications, boxes are cast without side outlets, then nipples are brazed on later where required. To drill holes for nipples, the box is mounted on a rotatable fixture (which can be indexed positively in 90° steps) on a radial drill. The arm has a Starrett 701 magnifier and scale to permit exact radial settings. Pilot holes are drilled to ¼-in. dia, then the hole is trepanned to desired size. Cutters have carbide tips.

Shock Soaker

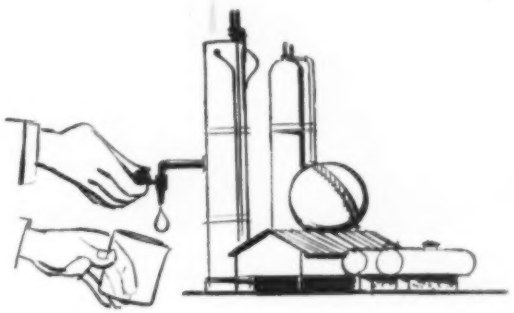
CATERPILLAR TRACTOR has moved a steam hammer, used to test steel samples, onto a special base consisting of a concrete-filled steel tank set on coil springs in a pit. This setup absorbs vibration of the hammer so other testing equipment is not disturbed.

Jig Table

FOR DRILLING and tapping holes over a surface, one company has developed a table fixture with screws and handwheels for adjustment in both directions horizontally. One turn of the handwheel is ¼ in. Work is clamped on the table, then moved around by handwheel.

Better Mousetrap

SOME TIME AGO (*AM*—May 14 '51, p174) we mentioned a special oil made by Hamilton Watch for lubricating its watches. Its cost: about 10c a drop. Now the company has had such a demand from watch-repair men that it has had to increase the capacity of its "refinery." As a result, cost has dropped to about 1c a drop, but you could still carry a month's production in one hand.



News of Metalworking

SHORT RUNS . . .

• Air Force finally put its foot down after three months of fruitless negotiations with Cuyahoga Heights, Ohio, village officials, who tried to put a $20,000 annual land tax squeeze on Alcoa, which proposed to set up a $40-million forging-press plant there. Alcoa applied to the village for a building permit Dec 29, was told the annual tax would be $20,000 —payment in advance or no permit. Alcoa refused, on grounds the land would be deeded to the government. The village council deadlocked on the issue for three months, and the mayor refused to break the tie. Air Force tempers hit the roof. Alcoa was told to go ahead, with full government protection, since no further obstructions to national defense could be tolerated. Meanwhile, a bill is before Congress to settle this and similar cases without delaying the defense effort.

• Air Force made almost $215,000 from its recent sale of 228 surplus machine tools at Marietta, Ga. Tools were offered to the public after thorough screening by military and government agencies. Still to be screened and offered for sale are 2000 tools.

• Westinghouse Electric Corp has come up with a proposal to establish a Federal agency to expose Communists who lead or influence labor unions. Proposal is aimed at the United Electrical Workers, which takes in some 20,000 Westinghouse employees, and which Westinghouse claims has been "identified as a Communist-dominated union on several occasions since it ceased to be identified with the CIO."

Capitol Hill Divided on Wilson Plan To Narrow Defense Production Base

WASHINGTON—Defense Secretary Charles E Wilson's ideas about changing the base of defense production have kicked up quite a stir here.

Mr Wilson, who told newsmen of his proposed plans to narrow rather than broaden the base of defense production, intends to reverse the standing three-year pattern of bringing in many secondary weapons producers, in order to spread defense production experience as broadly as possible in case of all-out war.

Basically, his idea is this:

• Switch production now to a few instead of many armaments producers, and try to get producers back into their own fields—i.e., instead of auto companies turning out planes, leave that to the planemakers. Get rid of marginal producers who up defense costs.

• Go ahead fast on weapons that can be stockpiled. Accumulate a reserve of these—guns, ammunition, utility planes, trucks, tanks, etc—and then quit producing them, to cut defense costs.

• Narrow current defense production of bigger and more experienced companies on weapons that are needed now and will continue to be needed because of obsolescence and consumption.

• Abandon the Vance Plan for stockpiling and keeping a war reserve of machine tools. Barring this, reduce the $500 million Vance tool program to conform only with needs of a dual-purpose plant program.

Washington reaction was immediate and startled. On the surface, at least, it appeared that Wilson had not discussed his ideas witn any of the people who would have to carry them out—such as ODM.

Reversal of Policy

True, plans were in the works for some reduction of the "broad base" policy laid down by former Defense Secretary Marshall in December 1950. Too, anticipated defense budget cuts of up to $5 billion automatically made some retrenchment in the production program necessary—but nobody expected Wilson's complete reversal of long-standing policy.

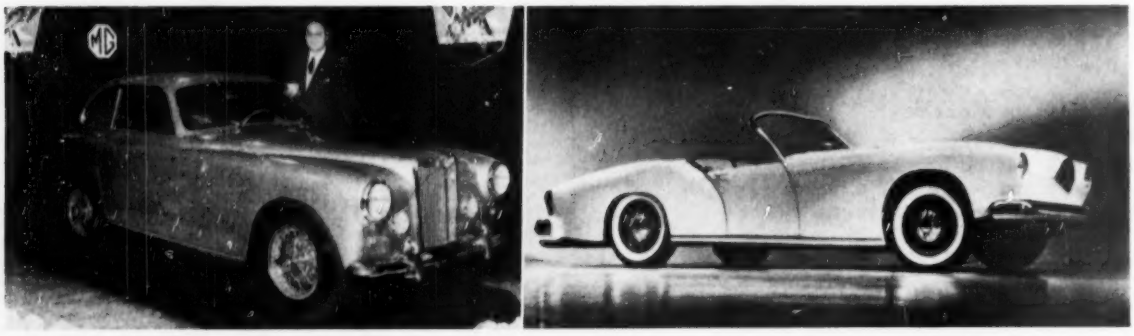
Overstepped Authority?

First signs that Wilson was running into a snag came from White House aides, who said that such a major decision—whether to retain a broad base, or award contracts to a chosen few—would have to be made by the President and the National Security Council, not the Pentagon. Washington consensus: changing the defense production program at this stage will cost more money than it would to continue status quo.

"More Harm than Good"

Former Defense Secretary Robert A Lovett feels that such a change would do more harm than good, especially at this stage. Testifying before the Smith subcommittee on am-

US, Foreign Designers Compete



FANTASTIC AND FUTURISTIC sports cars from the United States and Europe vied for top honors at the International Motor Sports Show in New York's Grand Central Palace, April 4-12. Left: a one-car international potpourri is the Arnolt Car, featuring a special body designed by Bertone of Italy mounted on a standard British MG chassis and

munition, he said that arms shortages can be avoided in the future "only if we don't cut the heart out of the military program and the industrial production on which it is based."

Senator Russell of Georgia, ranking Democrat on the Senate Armed Services Committee, wasn't so diplomatic. He termed Wilson's plan "a tragic mistake." Committee Chairman Senator Leverett D Saltonstall of Mass. told Wilson that any plan to reduce substantially the broad base scheme and the number of contractors would meet with stiff Senate opposition.

Small Defense Plants Administrator Yngvar Brynildssen claims any contraction in the defense production base would hurt small business, conflicting with Congressional policy.

ODM Surprised

ODM officials were startled. They first learned of the Wilson proposals by reading the newspaper. And, though some agreed that a second look at the broad base idea is needed, all disclaimed that the Wilson plan had been discussed with them, even informally.

What has Wilson thinking about pulling in horns on defense production is the staggering cost of maintaining the broad industrial base. It is abundantly clear to the Secretary that the US could get more weapons faster, and for less money, if contracts were shifted to firms with proven production ability and speed-up capacity.

Key to Wilson's thinking is his feeling on "marginal producers" and secondary sources of production. Even before his pronouncement of a week ago, he had remarked that too much emphasis has been put on "theoretical production which we may not need."

Wilson and some of his assistants take issue with claims that broad base production could be expanded practically overnight.

But the underlying reason why the Defense Secretary feels that the production base should be contracted is his faith in the dual-purpose plant idea, which he sees as a reserve of technical know-how, skilled workers and production capacity.

He excuses the inherent inefficiency of the dual plant—idleness of tools and parallel lines when no defense work is needed—as a necessary evil. A lot of this could be compensated by extra-special write-offs for dual-purpose production capacity—a proposal he has submitted to the Treasury for study.

What will ultimately happen will be something like this:

- Production horns will be pulled in—but not sharply. A $4-$5 billion cut in funds will force this anyway.
- No step-up in production of non-vital weapons. In fact, a reduction of contracting for some tanks, planes, etc, is already in the works.
- Dual-purpose plants will be increased—slowly. They will not take over until the arms build-up is complete, two or three years from now.
- Some Vance Plan money will remain in the budget. It won't be as much as Truman requested ($500 million), but it will stay, even if ODM has to take it to the White House and the Security Council.

Metalworking Abroad

(By McGraw-Hill World News)

INDIA—Orders for 10 million rupees worth of new plant and machinery have been placed abroad by the Indian government for setting up a machine tool plant near Bangalore. Some machinery has already arrived at the plant, which is being set up with the aid of Swiss engineers.

MEXICO—Second Annual Convention of the Mexican Association of Machinery importers is scheduled to be held in Monterrey on October 21-24, with some 200 importers expected to attend.

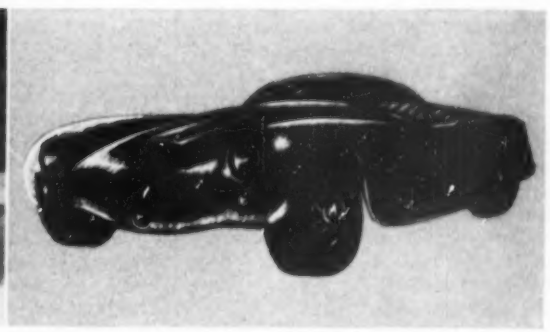
FRANCE—First French sports cars with one-piece molded glass fibre bodies will be shown at the Paris Motor Show. One such car, produced by Renault, will be entered in the LeMans Road Race.

AUSTRALIA — Welded Products, Ltd, of Alexandria, NSW, is negotiating with several US firms for reciprocal licensing agreements for welding equipment. It has already concluded negotiations to manufacture USA's Worthington Corp's line of welding positioners and turning rolls.

ENGLAND—Manufacturers here are working out plans for developing a worldwide market for UK-built earth-moving and roadmaking equipment. Prime market targets: Canada, Mexico, the Dutch Indies, Japan and Australia.

FRENCH MOROCCO—Of the 21,030 cars, trucks and motorcycles imported here in 1952, 9000 were from France, 5684 from the US, 2829 from Germany, 1533 from the UK.

for Growing Sports Car Market at NY Show



produced by S H Arnolt (standing beside car) at his Warsaw, Ind, plant. Price: about $3500. Second left: Kaiser-Frazer's DKF-161 fiberglas-bodied sports car, due for July production. Price: $3000. Third left: Germany's Mercedes-Benz 300 S sports convertible. Price: $12,457. Right: Banning Electrical Products Corp's electrically-powered Mota

TOOL COMPANIES INDIGNANT OVER ANTI-TRUST CHARGES

DETROIT—Three machine tool companies were indicted here April 14 by a Federal grand jury on charges of restraint and monopoly of trade in violation of the anti-trust act.

The Justice Department immediately announced that it was filing a civil suit against the three companies —Michigan Tool Co and National Broach & Machine Co, both of this city, and Fellows Gear Shaper Co, Springfield, Vt.

Summary of the charges was that the companies, by means of cross-licensing agreements and patent licensing since 1937, had conspired to allocate customers among themselves, had told each other their prices and discounts, had refrained from manufacture and sale of their products in certain situations, and had agreed not to license patents to other firms without the joint consent of all three companies.

Defendants Surprised

Surprise and indignation were the reactions of the defendant companies, none of whom had received a copy of the indictment and learned about it from the newspapers. When Michigan Tool president Oscar L Bard received a copy several hours later, he immediately expressed indignation. National Broach, still without a copy a day later, was forced to take a "no comment" attitude.

Michigan Tool lashed out at the licensing charges, with President Bard claiming his company "has never refused to grant a license to anyone, anywhere, in its 38-year history. Our business," he added, "is conducted on a highly competitive basis."

The Justice Department's claim that war production had been impaired because of the companies' actions lost credence in an analysis of NPA's M-41 orders.

These showed only some small hobbers, on the critical list in that machine tool class. Michigan Tool said its longest defense period delivery delay in recent years was four to five months, and that its current deliveries are about at peacetime levels. In 1945, the company claims, its attorneys voluntarily furnished the Justice Department with a copy of its licensing contracts, asked if they were in order, and received no criticism.

AMTDA Meeting Discusses Automation, Wilson Plan, Amortization

CINCINNATI — American Machine Tool Distributors Assn had the largest meeting in its history at the Netherland-Plaza Hotel April 16-17. The luncheon session of the first day, addressed by Charles F Kettering, retired vice president and research director of General Motors Corp, was the high spot of the program. A substantial number of builders were guests at the luncheon and at the open business sessions. John M Riordan, Association president and president of the Riordan Machinery Co, presided throughout.

Ford is looking to machine tool builders to assume responsibility for the design and procurement of automation—the intermachine materials handling equipment—in the future, H Rourke, general purchasing agent, Ford Motor Co, declared. This is a job for specialists in the machine tool industry and "should be considered an integral part of the machine we purchase from you."

Automation, he continued, should not be left to the customer to do the best he can for himself.

Mr Rourke named four perquisites that representatives of machine tool builders dealing with Ford should have: (1) know the products made by the builder from A to Z; (2) full support of the home office, including realistic prices; (3) help of topnotch demonstrators in showing how to use the machine, and of servicemen in taking care of emergencies after installation; and (4) prompt submission of proposals when requested, containing complete information.

Ford maintains a staff of expediters who constantly are checking the progress of machine tool orders, Mr Rourke revealed. He asked that they be received by "responsible people" in builders' plants. Costs today, more than ever before, are of prime consideration, he remarked.

The automobile industry in peacetime takes up to 40% of the machine tool industry's output, Mr Rourke said. In 1950, Ford alone accounted for over 13% of the industry's automobile business. Since 1903, Ford has bought 113,000 machine tools and presses. One-third are in use today.

Though the Munitions Board has come up with an estimate of government requirements for almost $1 billion of machine tools for the next three years, figures probably are not accurate, Donald M Pattison, former director NPA Metalworking Equipment Div and vice president Warner & Swasey Co, said. Estimates are to be revised every six months, next one being due July 1.

If Secretary of Defense Wilson's plan for narrowing the mobilization base should go through, the number of machine tools needed for defense purposes will be greatly reduced, according to Mr Pattison. It is doubtful anyway whether Washington will buy in 1953 as many machine tools as indicated by estimates. Analysis shows that government-owned tools being used by defense contractors are operating at only 30 to 40% of capacity, leaving a sizeable potential additional output available in an emergency.

Mr Pattison urged distributors to refrain from misleading customers into believing that they can get a priority or directive hereafter except for strictly defense or Atomic Energy Commission production. He reminded members that there will be no priorities for machine tools in the nondefense category after July 1. That goes for machine tool builders, too.

Nothing would stimulate sales so widely and so permanently as accelerated amortization of machine tools, Thomas R Rudel, chairman of the government relations committee and president of the Rudel Machinery Co, reported. "Accelerated amortization has been desired and sought after by all users of capital equipment. We should, as an Association, do every thing possible to make such amortization an immediate reality."

Mr Rudel described work of the various sub-committees. He went into some detail about the sub-committee on terms and conditions of doing business with the government, which worked closely with a similar NMTBA committee. He declared that "simplification and standardization of government purchasing can be of much profit to all of us."

He pointed out that "it is significant and gratifying that the men who make up the US government today at last realize the importance of our industry to national defense and to national welfare and prosperity."

NMTBA Talks Depreciation, Vance Plan, Foreign Trade at the Waldorf

NEW YORK—The machine tool industry's job today is to sell. Its main market is in replacement and modernization of existing equipment.

- The U.S. Treasury should permit more liberal depreciation of machine tools, thus encouraging modernization and taking off the greatest brake upon replacements.
- Restrictions that now block sales abroad of American machine tools should be removed.
- All government agencies should use a uniform contract for buying machine tools and thus correct current faulty procurement policies.
- The Vance Plan for building productive capacity for defense weapons rather than stockpiling large quantities of military end-items should be put into practice.

These were some of the important points stressed at the 51st spring meeting of the National Machine Tool Builders' Association at the Waldorf-Astoria April 8-10. Attendance was one of the largest on record. The dinner address by Dr John Allen Krout, vice president and provost of Columbia University, was a highspot.

Competitive Market

"If the competitive scramble for markets develops as I think it will," Swan E Bergstrom, president of the association and vice president of the Cincinnati Milling Machine Co, said, "any company that does not modernize will be sunk. It's our job to demonstrate that fact in dollars-and-cents figures." He declared that this competitive urge "will lead to a new wave of plant modernization and replacement, provided our salesmen are on the job at the right place and at the right time" to show how new machines will cut costs.

Our amazing type and rate of productivity, rather than production itself, have given this country its high standard of living, Mr Bergstrom stated. Machine tools are the basis of all industrial productivity.

Write-Offs

The biggest single factor in sales resistance today, he said, is the customer's inability to write off productive equipment within its useful life. Some form of accelerated depreciation is needed. Under present tax laws, it is difficult for a company to generate, out of its own earnings, the seed money required for the growth of tomorrow.

Vance Plan

After outlining advantages of the Vance Plan, Mr Bergstrom made these points: (1) Thus far it is only a committee recommendation and needs Congressional approval; (2) even if adopted, the volume of annual machine tool purchases would be only a fraction of the industry's capacity to produce and would not be evenly distributed throughout the industry; and (3) pending further consideration, the plan may have the effect of slowing down current defense buying.

The machine tool industry itself must maintain a continuous program of personnel modernization—learner, apprentice and engineering training—and of plant modernization, Mr Bergstrom emphasized. "We cannot expect our customers to take our medicine unless we take it ourselves."

"Above all," he commented, "we must rid ourselves of the idea that government ought to do something for our industry. If we are to be out from under government control, we should expect no help from government."

Priority to Defense

Builders should not divert or defer rated defense orders to take care of civilian customers who are pressuring them for deliveries, M A Hollengreen, chairman of the government relations committee and president of Landis Tool Co, said. Regulation M-41 is still in effect. What's more, no builder should take advantage of pool contracts to ship machines into storage, as some marginal producers are doing. GSA already has 188 such machines. Such practice may be used to prevent reestablishment of a pool contract system in a future emergency, Mr. Hollengreen said.

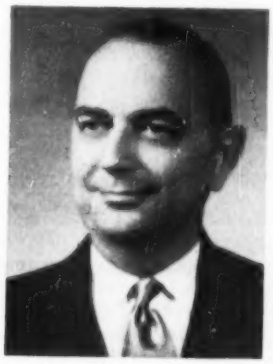
Only one job remains for the subcommittee on costs, Mr Hollengreen declared. That is to prepare a skeleton-control plan to be ready for the next emergency. He said that "there is a definite tendency in the Treasury Department and in Congress to change the depreciation laws." He then alluded to Senate Bill 298 which allows the taxpayer to determine the period of useful life of property.

Later on, the association may ask all builders to make a personal call upon their Congressmen, Mr Hollengreen said. He remarked that in the coming year the machine tool industry may have a chance to help reshape government policy so that the industry can do a much better job for the nation.

Defense Spending

Munitions Board has prepared a list of government defense requirements of machine tools over the next three years, Donald M Pattison, former director Metalworking Equip-

Swan E Bergstrom



M A Hollengreen

Donald M Pattison

Everett M Hicks

ment Division NPA and vice president of the Warner & Swasey Co, reported. About $250 million is for current needs, and some of these orders have been placed. The so-called "elephants" are not included. Around $600-$700 million (including elephants) are for future needs.

Legislation extending controls beyond June 30 has not yet been finalized, Mr Pattison said. He pointed out that builders no longer have a blanket rating for materials. He announced that NPA is to stay in the Department of Commerce. He believes that Exhibit D (critical machine list) of M-41 should be eliminated. For further remarks made by Mr Pattison, please turn to page 119.

Foreign Markets

The industry has not lost its foreign business permanently, Ralph J Kraut, chairman subcommittee on overseas markets and president Giddings & Lewis Machine Tool Co, stressed. First, US restrictions on foreign business should be removed. Second, many customers abroad, especially in Europe, prefer American machine tools. Third, foreign restrictions upon importation of US tools should be lifted. Fourth, work should be done toward solving the problem of dollar shortages abroad.

Mr Kraut expressed his belief that NMTBA can do much to get import restrictions removed on machine tools abroad by dealing directly with foreign government agencies. He cited the success of the British industry in dealing thus with Canadian officials. He voiced disappointment that so few U.S. builders intend to show at the Canadian Toronto Fair in June and at the European Fair at Brussels in September.

Overseas Competition

Foreign competition here at home should not be cause for undue worry, he said. U.S. builders have the advantages of freight, insurance, service, product guarantees, full legal responsibility in this country, superior product. The industry will not seek a tariff to equalize costs but will request holding the line against further tariff cuts. Though foreign machine tool sales in this country represent only 5% of total volume, they cover mostly standard machine tools and hence hit certain segments of the industry with more force. For import figures, please turn to page 119.

If the Vance Plan is partially adopted, the machine-tool industry can expect $500-$600 million of new government business in the next year or two, Ralph S Howe, chairman subcommittee on permanent defense capacity and executive vice president New Britain Machine Co, said. He devoted much of his talk to a detailed description of the plan and how it would work. Mr Howe believes that one portion of the Vance Committee's Plan has slight chance of being carried out—spending of $300 million by defense agencies to keep machine-tool reserves modern.

Small business will modernize its equipment if it can choose its own depreciation write-off period, Mr Howe contended. The reason that many small companies have not secured their share of defense orders since Korea is that their equipment was obsolete, inadequate and not accurate enough to meet required tolerances. "Small businesses cannot afford to wait 16-20 years to recover their investment long after defense contracts have been completed, possibly during non-profitable periods."

Government Buying

A 57-page report is to be submitted to Washington summarizing the industry's objections to certain government machine tool buying policies, Herbert L Tigges, chairman subcommittee on procurement policy and executive vice president of Baker Brothers, Inc, revealed in his report, which was read in his absence by R W Banfield, vice president Pratt & Whitney, Division Niles-Bement-Pond Co.

With the present unacceptable terms, additional cost to the government and to the builder, as well as delays in delivery of equipment for defense purposes, is inevitable, Mr Tigges said. He pointed out that standardization in cataloging of supply items cannot successfully be applied to machine tools and should not be attempted. Machine tools are too largely custom-built and diversified in individual characteristics to lend themselves to such cataloging, he said.

Machine tool sales to the government for national defense should be subject to the same renegotiation procedure as sales to private industry for defense production, Alexander G Bryant, chairman committee on renegotiation and vice president of the Cleereman Machine Tool Co, said. "One hundred percent renegotiation of sales of government machines is completely unrealistic," he contended. "They should be entitled to the same partial exemption as sales to private industry." The latter sales are subject to only partial renegotiation because the machines will continue to be used for peacetime production after the defense emergency. The same, with few exceptions, is true of government-bought machines.

Taxation

This five-point program of tax recommendations has been put before the Joint Committee (Congressional) on Internal Revenue, K L Finkenstaedt, chairman subcommittee on tax policy and executive vice president of the W F & John Barnes Co, reported:

(1) Section 433 of Internal Revenue Code be amended retroactively to allow imposition of the excess profits tax to provide an adjustment for income from sales of durable productive equipment representing future rather than emergency serviceability; (2) Section 124A be amended retroactively on machine-tool production expansion so that 100% certification may be granted for all facilities, any part of which already has been certified. Also, an amendment should be passed permitting the President to decide by proclamation whether an industry had completed its emergency production schedule, and if so to allow the taxpayer to recompute his amortization over the period ending with the proclamation; (3) Section 23(1) should be amended to authorize a system of optional depreciation on durable productive equipment acquired after Dec 31, 1952; (4) Double taxation of corporate earnings should be eliminated as soon as revenue requirements will permit; (5) Amendments should be made to clarify and make more administratively feasible Section 102 regarding the surtax on corporations improperly accumulating surplus. Another proposal informally discussed with government officials, Mr Finkenstaedt said, is a liberalization of allowable deductions for research and development.

The next Machine Tool Show will be held the first two weeks in September 1955, Everett M Hicks, chairman machine tool show committee and vice president of Norton Co, told

the members. The site has not yet been chosen, but Chicago hotels are reserving a large block of rooms in anticipation that the show will be in that city. Chicago appears to have the edge on other cities, but enough space has not been found there as yet.

Mr Hicks said that his committee is recommending an association policy of having a show every five years. It also contemplates changes in show rules, especially standardizing booth decorations and having them included in exhibit space charges. That would follow the procedure in European shows.

Sales Promotion

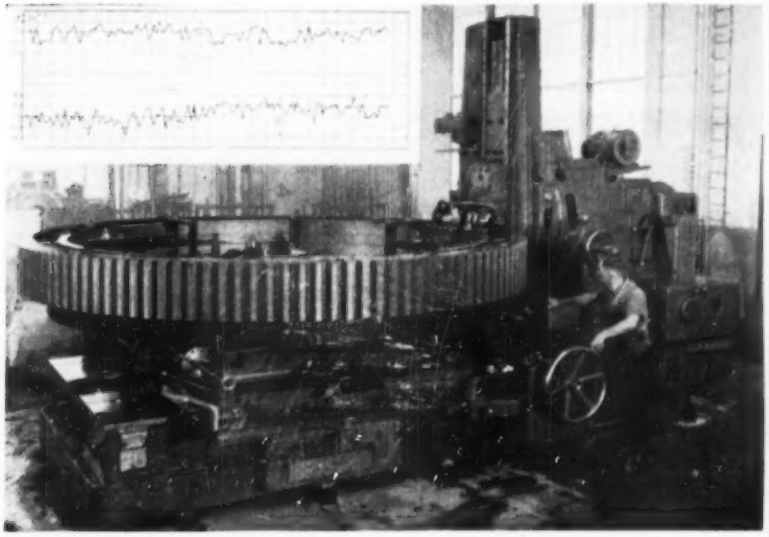
Metalworking's selling job is much bigger than it was at the beginning of World War II and advertising and sales promotion are part of that job, Joseph T Vinbury, chairman advertising committee and advertising manager of the New Britain Machine Co, declared. Today there are twice as many plants, twice as many prospects, twice the buying power. On top of that, "we still have the job of educating the laymen, the military and the government." He described what his committee has done to aid the industry. He said that the industry's advertising and sales promotion men are organized into 10 advertising councils, one for each major area. He told how the committee had sponsored the contest among association members for the best advertising copy in 1952, a contest in which there were 222 entries. Mr Bergstrom made the presentation of awards.

Standards

The electrical standards committee of NMTBA will soon recommend a revised Machine Tool Industry Standard, which will conform as closely as possible to JIC standards, Tell Berna, association general manager, reported. The two cannot be brought into complete agreement because NMTBA must conform to the national electrical code. Hydraulic press standards committee is about to submit to each company a revised set of standards.

In the mechanical press field, Mr Berna said, the builder must bear in mind the wishes of the great majority of his customers; and automobile makers are not the largest buyers of smaller-size presses. The committee probably will meet with the JIC group in June. Hydraulic standards, revised by JIC in January, have not yet been issued. The revisions are mostly for greater clarity and should not cause trouble.

The training standards committee, Mr Berna commented, is about to issue suggestions for learner training.



GIANT PLANER. Built for Bucyrus-Erie Co, South Milwaukee, newly designed Type SH-350/500 Maag gear planer is shown under test at Zurich. Test piece is a cast-steel cement-mill gear 13.8-in. wide and 153-in. OD. Total cutting time for the 128 teeth (0.85 DP) was 70 hr, somewhat slower than normal because the 80,000-psi steel was uneven in quality, but unusually high accuracy was attained, as shown in insert chart. Maximum tooth-to-tooth error was 0.0008 in., maximum periodic error was 0.0034 in., or 9.3 arc seconds

Plant Expansion

Timken Roller Bearing Co announces a $3.25 million expansion and improvement program at its Bucyrus, Ohio, bearing plant. The addition will include a new toolroom, office building, cafeteria and locker room, boiler plant, and new machines and equipment. The machinery and equipment will include green machining facilities for five proposed production lines.

J M Little & Associates, Toledo industrial designing firm, is inaugurating a special machinery development department.

Boeing Airplane Co has opened a $4.2 million, five-story addition to its Seattle engineering building. The new 225,000 sq ft building includes an escalator, which, according to Boeing officials will carry the same traffic as several elevators at half the cost.

Crouse-Hinds Co, Syracuse, N Y, expects to complete its 180,000 sq ft expansion program, started in 1946, by this year's end. Included in the program are construction of a general machining and toolmaking shop, two new buildings to house a heavy machining department and assembly facilities, and a 45,000 sq ft foundry.

Federal Electric Products Co's one-story, 132,000 sq ft plant at Scranton, Pa., now under construction at a cost of $3 million, will begin operations in September. The plant, which will employ from 650 to 750 persons, will manufacture heavy power and transmission switchgear—a new line for Federal Electric.

Ravenna Arsenal, Ravenna, Ohio, is launching a $1.5 million program to expand its shell and mine-loading facilities. Included in the project is mechanization of the Arsenal's Line One for production of 90 mm shells, which will be retooled and new conveyor equipment added. Line Four, idle since WWII, will be in production by early summer as part of the expansion.

Bullard Co, Bridgeport, Conn, is building a new office addition and a tool room. South end of the tool room will be devoted to fabrication, and the north end will be given over to the assembly of precision tools, Bullard officials state.

AIR FORCE CANCELS $100 MILLION JET ORDERS

WASHINGTON — Air force has canceled $100 million in orders for J-47 jet engines, used for powering Sabrejets and B-47's. Reason for cancellation of the orders, according to the Air Force, is that the engines can now be operated for twice as long as expected originally.

Most affected by the cutback will be Packard and Studebaker, who subcontract production of the engines for General Electric Co. Packard and Studebaker will cut their production one-third on the engines (about 2000 engines), winding up their contracts sometime next year.

Also ordered is a stretchout in J-47 production at GE plants in Evendale, Ohio, and Lynn, Mass.

CONTROL PANELS at SKF's new Frankford, Pa, roller and ball bearing plant are made up of nine electronic circular-chart recording potentiometers, each controlling six heat-treating furnace burners

Intense Competition Coming, Machine Tool Electrification Forum Told

PITTSBURGH—A new cycle for the machine tool industry, in which manufacture of machines to cut the cost of producing civilian goods will supplant machines for making defense armament as the major source of the machine tool industry's business, was forecast by Tell Berna, general manager of NMBTA, at the 17th Annual Machine Tool Electrification Forum sponsored by Westinghouse Electric Corp here, April 14 and 15.

Many signs point to a period of intense competition, according to Mr Berna, who predicts this will apply not only to products, but to prices—a price competition not seen in this country for some years. "The top question," he said, "is going to be 'How can we get our costs down?' "

It is up to the machine tool builders to supply the answer to that question. Mr Berna said: "Some of our customers may not yet realize the potentialities of this situation. Many of them think, no doubt, that they are well equipped with the new machine tools bought for production of weapons during WWII, but few seem to realize that most of these machine tools are now 10 years old and were designed back in 1934-35.

New Tools Needed

"There has accumulated in this country," he continued, "a tremendous pool of obsolete equipment. If the makers of civilian goods are to meet the challenge of tomorrow, they must replace these obsolete machine tools with new models which will do better work and produce more parts per hour. This in turn presents a challenge to the machine tool industry . . . we must have new models ready that will demonstrate such a saving that their purchase will be imperative."

Technical Sessions

Automatic loading and unloading of machine tools, and electrical controls for the automatic cycling of machine tools were spotlighted during the technical discussions—as were problems involved in developing workable standards for wiring.

Kurt O Tech, Cross Co, discussed coordination of electrical, hydraulic and mechanical elements in machine tool design, pointing out that tremendous advances in machine tool design since WWII have paved the way for the automatic factory. To a great extent, he said, these advances have consisted of gradually combining more and more operations into a single machine. This in turn has necessitated automatic clamping, cutting and materials handling.

"Success of our efforts in this direction," Mr Tech continued, "depend on our ability to control machine downtime. Technically speaking, there is no limit to the number of operations that can be combined in one machine or process. But when we consider efficiency there is a limit . . . it is reduction of downtime and increasing of efficiency that will make automatic production lines possible."

Rey H Juengel of Ford Motor Co told how his company has coordinated efforts of its machine and automation designers to produce efficient automated lines.

Stanley I Rice of Heald Machine Co told of problems encountered in tying elements of a transfer machine tool together electrically. H E Grimes, Avey Drilling Machine Co, described application of rotating sequence switches for machine tool control telephone circuits.

Automatic loaders for crankshaft turning lathes were described by Nelson D Cooper of R K LeBlond Machine Tool Co, who followed his talk with a film on their operation. Use of standard motors for driving spindles of precision surface grinders, made possible by vibration absorbing mountings, was discussed by W C Gallmeyer of Gallmeyer & Livingston Co.

Also discussed at the Forum were: European design of electrical equipment and international standards, by W H Formhals, Westinghouse Electric Corp; and unique applications of electrical equipment, by J M Morgan of Cincinnati Milling Machine Co, A E Good of American Steel Foundries' King Machine Tool Div, J S Madden of G A Gray Co, and L F Grantham of Baldwin-Lima-Hamilton Corp's Niles Tool Div.

Machine Tool Industry Employment Still on Upgrade, Survey Shows

WASHINGTON—Employment in the machine tool industry increased about 4% between January 1952 and January 1953, will go up another 3% by July 1953, and then will level off. So says a Department of Labor survey of 211 machine tool builders employing 50 or more workers, made in January of this year. Companies covered by the survey employ a total of 107,000 workers, representing almost the entire machine tool industry.

Machine tool employment has risen about 70% since Korea, the Labor Department estimates. The stimulants: (1) an increase of 350% in value of machine tool shipments from 1949 ($249 million) to 1952 ($1.1 billion); (2) plant expansion of $131 million scheduled for completion by January 1954.

The survey reveals that much-publicized labor shortages are not serious production bottlenecks. About 40% of the machine tool companies reported difficulty in obtaining all the workers they needed. But shortages in any single plant were usually few, and didn't handicap operations seriously. Only eight companies—four in Cleveland—reported that lack of manpower impeded essential output in their plants.

Other survey data:

- Machine tool order backlogs are down to about nine months, only 50% of the total for the military. In January 1952, backlogs were more than one year, 70% of the total on military order.
- In the last half of '52, total new machine tool orders began to fall, reaching a low point in November (twice the 1945-47 average). At the same time, monthly shipments continued at a rate of more than three times the 1945-47 average.
- The average work week in machine tool plants is 47.5 hours—an hour less than the previous year's average, but more than five hours above the average for all durable goods manufacturing.
- Best estimate is that machine tool production will be evenly divided between military and civilian consumers—total volume of production will remain "fairly steady" through 1953, the Labor Dept believes.

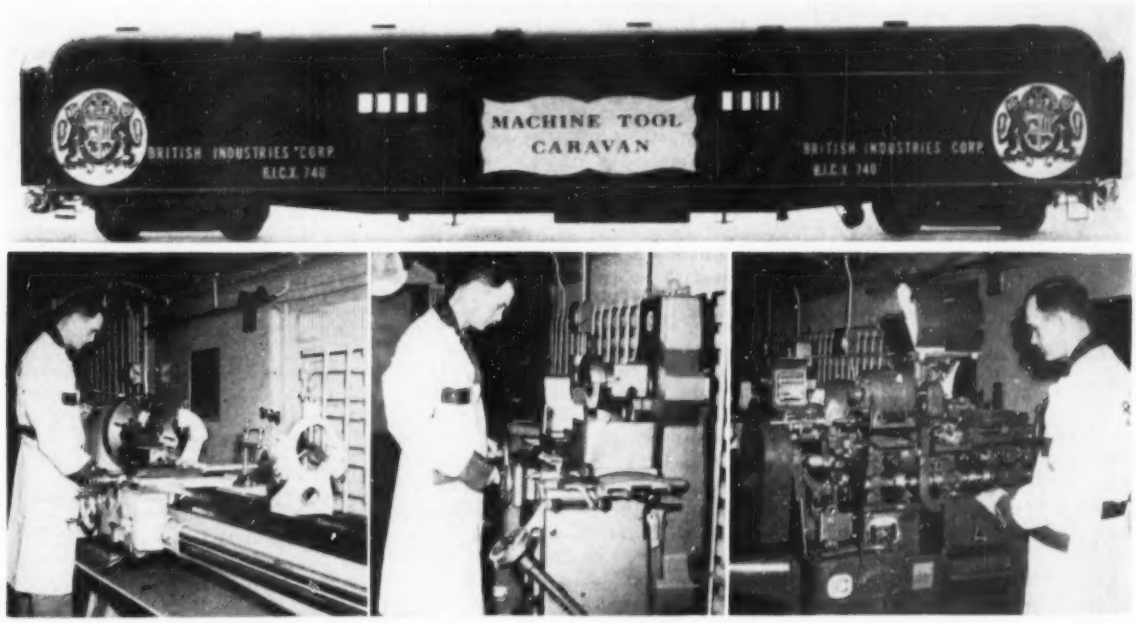
Distributors Named

Artys Sales Co, New York, is new sales representative for Shuster wire straightening and cutting machines, manufactured by **Mettler Machine Tool Co,** New Haven, Conn, in the New York-New Jersey area.

Truman E Longley Co, Cleveland, has been named northern Ohio distributor for **Illinois Tool Works'** Illinite standard and semi-standard cutting tools.

C A Pafenbach & Co, Los Angeles, has replaced **Western Drill & Tool Supply Co** of that city as West Coast agent for **Lavalee & Ide** reamers.

Sales & Service Machinery Co, Inc, Philadelphia, will represent the following lines in the Philadelphia, southern New Jersey, Delaware, Maryland and Washington, D C, areas: **R K LeBlond Machine Tool Co; American Steel Foundries' Elmes Engineering Div; Cleveland Crane & Engineering Co's Steelweld Div; Peerless Machine Co; New Britain Machine Co's Lucas Machine Div; Fosdick Machine Tool Co; Rockford Machine Tool Co; Hartford Special Machine Co; Minster Machine Co; Hammond Machinery Builders, Inc.**



MACHINE TOOL CARAVAN, a unique means of bringing machine tools to the doors and even into the plants of prospective users, is being routed around the country by British Industries Corp, US sales organization for English toolmakers. The railroad-car caravan houses $100,000 worth of machine tools set up under actual shop conditions and operated by factory-trained crews. Three of the 14 machine tools comprising the caravan (shown above) are: (left) Colchester 17-in. lathe; (center) Jones & Shipman No. 540 hydraulic surface grinder; (right) CVA No. 8 single-spindle automatic screw machine. Caravan's route through May 27 will touch on Eastern and Midwest metalworking centers.

F C Crawford

J D Wright

G M Graetz

T G Barnes

Names in the News

Frederick C Crawford, president of Thompson Products, Inc, who since 1933 has presided at the company's board meetings in lieu of an officially appointed board chairman, was recently named chairman. He is succeeded as president by **John D Wright,** formerly vice president and general manager.

Samuel P Felix, superintendent of De Laval Turbine Co's North plant, has been appointed general manager of the De Laval Pacific Co, San Francisco.

William E Ackermann, assistant vice president of Wheeling Steel Corp, vice president of Wheeling Corrugating Co, and president of Ackermann Mfg Co, has retired from all three positions after 47 years with Wheeling Steel operations.

Albert G Lindsay, formerly manager of Crosley Corp's Foreign Division, has been named manager of Rockwell Mfg Co's Export and International Divisions and will headquarter at Rockwell's main offices in Pittsburgh. Mr Lindsay was born in France and educated there and in Germany and Switzerland and has been engaged in international trade for 30 years.

Samuel S Board, Jr, has been appointed director of research for Farrel-Birmingham Co, Inc's Buffalo plant, where he has been assistant director since 1947.

George B Sommers, formerly of Sylvania Electric Products Co, has been appointed director of marketing for Food Machinery & Chemical Corp's machinery divisions.

George M Graetz has been named manager of A O Smith Corp Welding Products Div's new Eastern plant at Lancaster, Pa. Mr Graetz, for the last year served as assistant to A O Smith's group executive and as project manager for developing the new plant.

Robert H Morse, Jr, director and chairman of Canadian Fairbanks-Morse, Ltd's executive committee, was recently elected president and general manager of the Montreal firm. Also elected were: Executive Vice President **J E McQuilkin,** Vice President **C W Coughlin,** and Vice President **H C Reindfleisch.**

S L Crawshaw has been elected president of Amgears, Inc, Chicago subsidiary of Hupp Corp, and will head Amgears Chicago operations. Mr Crawshaw is president of American Gear Manufacturers Assn.

Eugene A Pellizoni, until recently assistant works manager of Mack Mfg Corp, has been appointed works manager for Borg-Warner Corp's Atkins Saw Div, Indianapolis.

Tom McMichan, works manager, and **Frank Stevenson,** assistant works manager of Cooper-Bessemer Corp's Grove City, Pa, plant, have been appointed special assistants to the president and will be stationed at C-B's main plant in Mt Vernon, Ohio. Also promoted are: **Willard Luli,** production manager to Grove City works manager; **Hugh Stevenson,** superintendent to Grove City assistant works manager; **Ken Martin,** to production manager; **Guy Gahagan,** general superintendent; and **Clarence Evans** to day shop superintendent.

T G Barnes, since 1951 production manager for Firth Sterling, Inc, Pittsburgh, has been named general sales manager. He was formerly with Reynolds Metals Co. Succeeding Mr Barnes as production manager is **G A Wilson,** formerly general superintendent of the company's Carbide Div.

H J Service has been appointed manager manufacturing for General Electric Co's Aircraft Gas Turbine Div's Accessory Turbine section.

C I Burdick, formerly staff engineer with Dana Corp, has been named director of industrial engineering at Willys-Overland.

Dr C N Challacombe has been named assistant director research; **Earl H Schaefer,** head engineering department; **Max Favret,** technical coordinator; and **Richard W McCormack,** chief production engineer for Elgin National Watch Co.

Woodrow W DeMuth has been appointed superintendent of plant engineering at Servel, Inc, Evansville, Ind. He was formerly in charge of plant layout at Frigidaire's No. 2 Dayton plant.

Charles J Linduska and **Howard W Carlisle** have been appointed assistants to the sales manager of Clearing Machine Corp, Chicago. Mr Linduska, with Clearing since 1936, will be responsible for pricing policies. Mr Carlisle, who for the last two years has been chief of NPA's Press & Forging Section, will work with the field sales force.

Jack G Allen, formerly vice president of Plomb Tool Co, Los Angeles, was recently elected vice president of Bingham-Herbrand Corp, Fremont, Ohio, forgings and stampings manufacturer.

Ray Bishop

R C Wietersen

D H Comtois

D E Hawkinson

Ray Bishop, superintendent of J I Case Co's Rock Island, Ill., works, has been appointed manager.

R C Wietersen, director of purchases for the Buda Co, Harvey, Ill, has been elected president of the Internal Combustion Engine Institute. Other officers elected: vice president, **J E Heuser,** Le Roi Co, Milwaukee; secretary, **R H Kerr,** Climax Engine & Pump Mfg Co, Clinton, Iowa; treasurer, **J D Cook,** Hercules Motor Corp, Canton, Ohio.

M Nielsen, since April 1 a vice president of Babcock & Wilcox Co, has been placed in full charge of B&W's Boiler Division.

Walter F. Greenwood, formerly of the Air Materiel Command, has joined Cleveland Welding Co as assistant to the president.

C B Phillips, vice president in charge of sales for Surface Combustion Corp, Toledo, was recently re-elected first vice president of the National Warm Heating & Air Conditioning Association.

David H Comtois has been appointed director of sales for the Screw Corp of America, New Britain, Conn. Mr Comtois was formerly manager of standard parts for American Hardware's Corbin Screw Div.

Donald E Hawkinson has been named to succeed the late **John M Macrae** as sales manager of Greenlee Bros & Co's Special Machine Tool Dept, Rockford, Ill. Mr Hawkinson, a 26-year employee of Greenlee, was for 10 years assistant chief engineer in charge of special machine tool design.

Joseph L Geenens, formerly superintendent of the Alnico permanent magnet section of GE's Carboloy operation, Schenectady, has been named manufacturing superintendent of Carboloy's Edmore, Mich, plant.

Albert J McLaren has been appointed sales manager of the Cross Co, Detroit machine tool manufacturing firm. With the company since 1947, Mr McLaren formerly operated the Mechanical Tool & Engineering Co, New York.

OBITUARIES

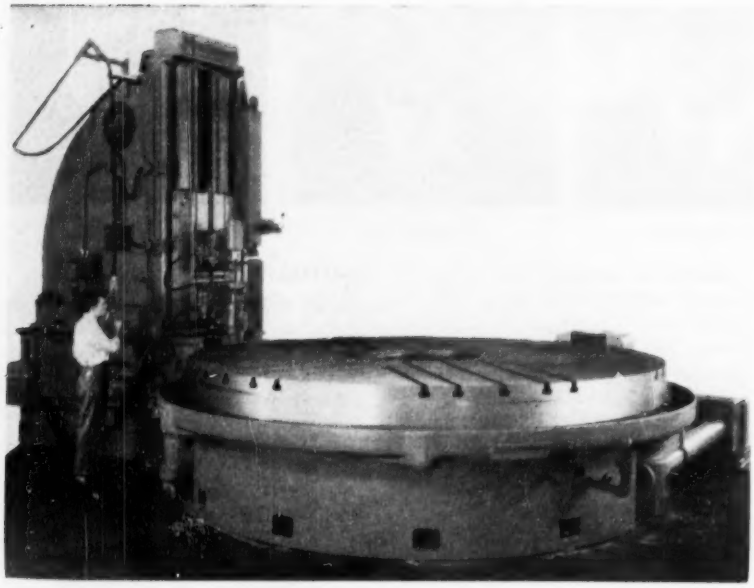
Carl E Johnson, one of the founders of Sterling Electric Motors, Inc, Los Angeles, died at his home in San Marino, Calif, March 26. Mr Johnson made many technical contributions

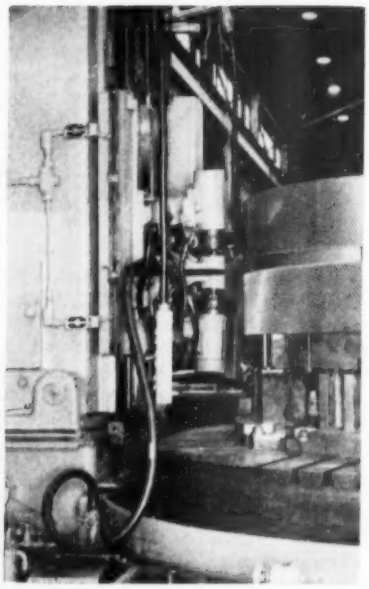
C E Johnson

to the electrical motor field, holding more than 55 patents for various types of fan motors, assemblies, variable speed units, etc. Notable among his inventions is the herringbone rotor for silent motors.

GRINDING PROBLEMS get a going over from top executives of Norton Co's Grinding Machine Division in the conference room of the Division's new $6 million Worcester, Mass, plant, which went into production last month. Left to right: Everett M Hicks, vice president and manager; Walter G Johnson, manager of research and engineering; Iver G Freeman, factory manager; Hugh T Price, production manager; and Robert D Lawson, sales manager

New Shop Equipment





Michigan Tool Finishers Shave 15-ft Gears

A line of standard vertical shaving machines to handle gears up to 15-ft dia and with face widths up to 48 in., the V-series has been introduced by Michigan Tool Co. Four models with 48-, 72-, 120-, and 180-in. capacities handle spur, helical, or herringbone gears. Gears can be internal or external, with or without integral shafts. Such gears are required for marine, railroad, powerplant, ordnance, and other large installations.

Accuracies to a few tenths of a thousandth are reported for 15-ft gears. The machines are also said to reduce or eliminate lapping.

Shaving of such gears, rather than lapping or grinding, is said to provide more accurate control of the true involute forms especially at the pitch line. The ability to incorporate and control tip relief in the tooth form of the gear tooth avoids chance of interference as the mating gears roll into mesh.

Surface finish as fine as 12 mu in. rms can be produced. Hobbing time is reduced because multiple-thread hobs rather than single-thread hobs can be used in roughing and semi-finishing.

All models except the V-48 are available with dual cutting heads. The two cutting heads are independently adjustable for correct angle, and the top head may be adjusted for height. Two cutters reduce cutting time and permit simultaneous shaving of both helix faces of herringbone gears.

Shaving cutters, shaped similar to gears but with teeth serrated to provide a series of cutting edges, are mounted with axis crossed with the gear axis. Cutters are of one-piece construction but have a wide groove in the center. This gives the effect of two cutters and provides two shaving zones on each gear. Each zone guides and steadies the other.

A checking device has been designed for the V-series so that a gear can be checked for runout on both shaft and rim, and for axial pitch, while mounted on the machine table. This device is mounted independently on the vertical slide. Vertical gage blocks are used with the micrometer when checking axial pitch.

Head of the machine can be tilted forward or backward so that the shaved surface can be tapered to provide total-face-width contact under deflection conditions that result from heavy loads.

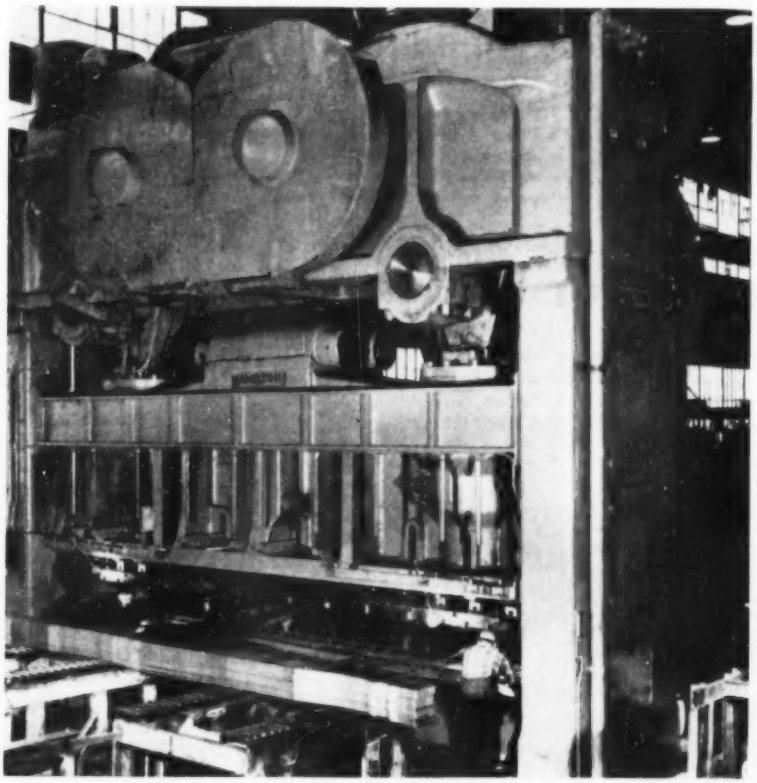
SPECIFICATIONS OF MICHIGAN TOOL V-SERIES SHAVERS

	V-180	V-120	V-72	V-48
CAPACITY:				
gear diameter, min, in.	100	60	20	8
gear diameter, max, in.	180	120	72	48
gear face width, max, in.	65	50	50	30
table hole, dia, in.	36	30	18	12½
MACHINE SIZE:				
length, in.	210	207		124
width, in.	208	147		94
height, in.	166	148		126
TABLE:				
speed, min, rpm	0.93	1.29	3.25	15.6
speed, max, rpm	15.16	28.62	72.33	186.6
motor, hp	60	25	15	7½

Materials and Parts

Tables on all but the V-48 are supported by an oil film whose pressure can be adjusted to suit varying table loads. Accurate leveling is maintained to 0.0003 in. through a strain gage which checks and keeps uniform the strain on each leveling jack, in conjunction with the leveling pads and a sensitive spirit level. Deflection measured in micro-inches.

Michigan Tool Co, 7171 E McNichols Road, Detroit 12, Mich



Hamilton Side-Rail Press Built With Cold-Stressed Tie Rods

Instead of heating and shrinking the tie rods, they are cold stressed with hydraulic jacks in this 4000-ton mechanical press built for Midland Steel Products Co to form side rails for truck chassis. Stress in the rods is equal to the maximum safe working capacity of the press.

Bed, slide, and arch were each made in two pieces held together by heated and shrunk rods. The bed is equipped with six 42-in.-dia air cushions providing 415 tons of pad pressure with air at 100 psi. The six cushions are linked together with their operating valves controlled by one pilot valve. Thus the six cushions operate as a unit. There is said to be no upward creep during the dwell period on bottom because the air is at atmospheric pressure. At a predetermined point of the up-stroke, the pilot valve closes the operating valves and air is bled back into the six cushions to return the pressure pad to its top position.

Clear space between uprights and gibs is 320 in. Stroke of slide is 22 in., adjustment 12 in., and shut height 40 in. Drive motor is 150 hp, and slide-adjusting motor 25 hp.

Hamilton Press Div, Baldwin-Lima-Hamilton Corp, 425 Curtis Bldg, Detroit 2, Mich

...INCLUDING

Line of presses built for Hidraw process of rubber-pad forming. page 184

Vise clamps work on machine table with one adjusting screw. page 184

Mobile power units on special machine simplify maintenance and replacement. page 190

Variable-speed drive provides flexibility in mounting arrangements. page 192

Thread grinder is adjustable for pitch angles up to 40°. page 194

Electric furnace operates at 2400 F with loads of 350 lb per hour. page 196

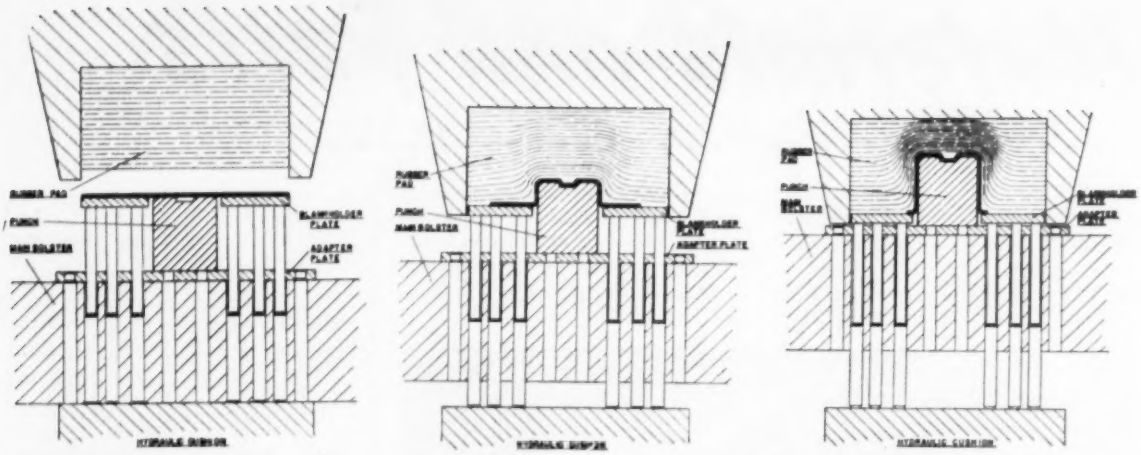
Turret toolholder is said to index within 0.0005 in. of original setting. page 198

Portable black-light inspection unit for detecting oil leaks and flaws. page 200

...and in May 11

Materials-Handling Show-in-Print describing new equipment to be shown in Philadelphia the following week.

Hydraulic press designed for cold-drawing artillery projectiles has a pipeless main circuit.

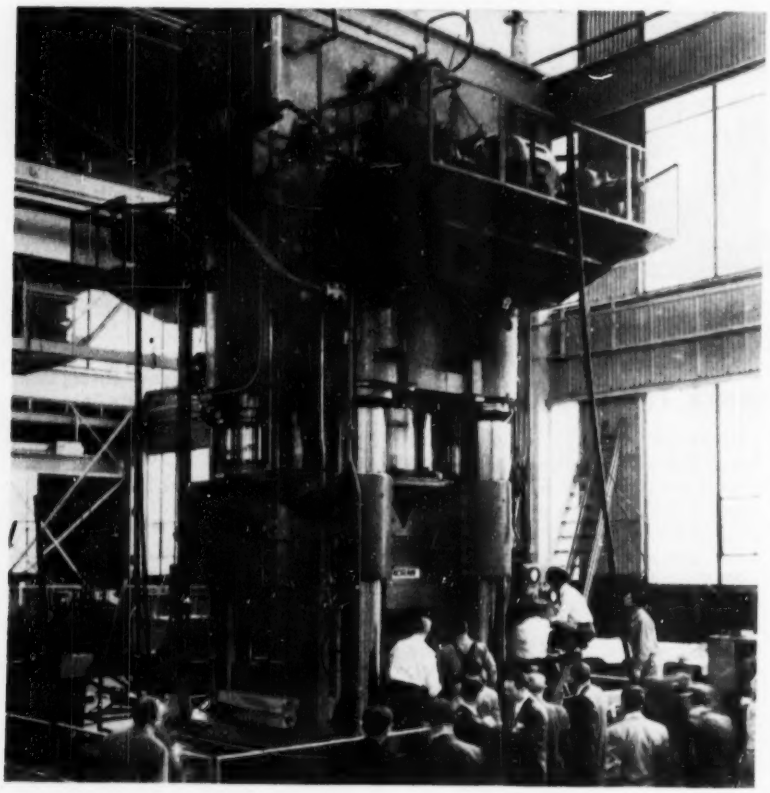


Process starts with blank placed on blankholder plate which is flush with top of punch. As main platen descends, pressure is generated in rubber pad gripping the blank between pad and blankholder. As platen continues down, pressure builds up, forcing blank over punch.

Pressure of hydraulic cushion controls forming pressure. Trimming can be performed by placing a sharp shoulder in the punch. When platen reverses, blankholder remains in down position until pad has cleared drawn part. Pullback pressure to die cushion ejects part from punch.

HPM Line of Presses for Hidraw Process

A new method for deep drawing metal parts by a combination cushion and rubber-pad process is the Hidraw process developed by Consolidated Vultee Aircraft Corp. Hydraulic Press Manufacturing Co has developed a line of presses from 1000 to 7000 tons that can handle Hidraw and also be used for the Guerin process.



First commercial model of a Hidraw press is this 7000-ton model

The Hidraw process is said to have the following advantages: Part is in contact with rubber and male die only while the draw operation is being performed. Uniform thickness and minimum stretching because the part is formed by fluid pressure rather than by an ironing operation. Difficult contours can be formed because there is no unsupported metal. Tooling is inexpensive for small production lots.

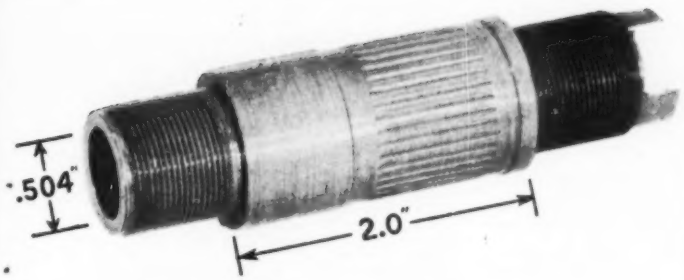
Pressure in the hydraulic cushion (which controls the forming pressure) is adjustable to a preset stroke pattern. Rubber pressures have ranged from 4000 to 10,000 psi. Note that it is the travel of the cushion rather than travel of the main slide that determines depth of draw.

The cushion must have a capacity 90% that of the main ram to permit forming parts down to 10% of the area of the pad holder. The smaller the part, the higher the cushion pressure required.

Presses are equipped with two-station and four-station tables, arranged for the assembly and dismantling of the Hidraw tools on the tables with the tables in the "out" position. Guerin forming is possible by placing a thin overlay plate over the pin hole pattern in the top of the work-loading table.

For high-pressure Guerin operations, an auxiliary companion bolster is located at index points on the work-loading table. Form blocks are loaded directly on top of this bolster.

The Hydraulic Press Manufacturing Co, Mount Gilead, Ohio



450% Increase in Cylinder Production

when prominent manufacturer switched to SUNNEN HONING

PROBLEM: Step up production of high pressure (5000 psi) grease pump cylinder.
MATERIAL: Nitralloy.
HOLE DIAMETER: .504" +.00005" −.00000"
HOLE LENGTH: 2"
HARDNESS: Rockwell 63 "C".
STOCK REMOVAL: .001"
FINISH: 3 micro-inches RMS.
MANUFACTURER: Lincoln Engineering Co., St. Louis.

SOLUTION: Sunnen Model MBB Precision Honing Machine with standard K16 honing unit, using 220 grit alundum abrasive stone and Sunnen MAN-844 Honing Oil. Semi-skilled labor is used.

RESULTS: 45 parts per hour, including gaging time—a 450% increase obtained by switching the job from lapping to honing. And equally as important, parts are straight and round, with a better seal between the cylinder and the piston. The production rate is highly satisfactory considering that the tolerance allowed is only 50 millionths.

TYPICAL HONED PARTS

Cast iron hydraulic cylinder

Bronze motor bearing

Steel worm gear

SUNNEN PRODUCTS COMPANY
7922 Manchester Avenue, St. Louis 17, Missouri
Canadian Factory: Chatham, Ontario

In plant after plant Sunnen Honing Machines have been the solution to production problems that could not be handled by drilling, reaming, boring, lapping, or grinding.

You'll find them economical for job lots as well as long production runs . . . for de-burring as well as micro-fitting . . . for producing holes to engineering specifications as well as for eliminating manufacturing bottlenecks.

These machines generate geometrically perfect holes with fast stock removal . . . produce a guaranteed accuracy of .0001" or better and surface finish to 2 micro-inches RMS . . . have a diameter range of ⅛" to 2⅝" . . . require no jigs or fixtures . . . are used in thousands of plants in production, tool room, maintenance, salvage. Average installation costs less than $1,000.

Sunnen Honing Machines may be *your* answer, too. Investigate now.

Mail the Coupon NOW for Free Booklet

-723

Sunnen Products Co.
7922 Manchester Ave., St. Louis 17, Missouri

☐ Send Free Booklet on Sunnen Honing
☐ Have A Field Engineer Call, no obligation

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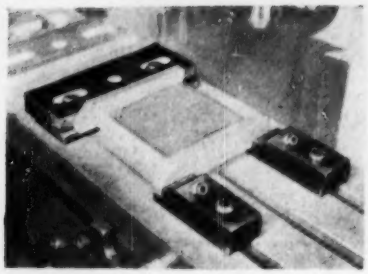
Company.....
Address.....
City..... Zone..... State.....



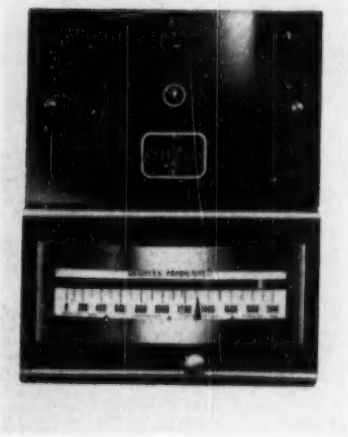
J & S Vise Eliminates Complicated Clamping Setups

J & S Double ½ vise for jig borers, millers, planers, and shapers, permits loading and unloading by loosening one adjusting screw on the opposing clamp, eliminating complicated clamping arrangements and trial-and-error setups.

Used in opposition with J & S jaw clamps, its hinged spring-loaded jaw secures workpieces rigidly to any machine tool. Hinged lip in-and-down action, combined with in-and-down action of the clamp holds workpiece against the table with a ½- to 3-ton force, absolutely parallel.

Unit eliminates heavy miller vises and allows processing of more pieces in one setup on millers; it does away with complicated strap and finger setups on planers, and eliminates all vises on shapers.

J & S Tool Co, Inc, 644 W Mt Pleasant Ave, Livingston, NJ



Bristol Line of Pyrometer Controllers

Line of Free-Vane electronic pyrometer controllers is available to actuate relays, electric contactors, solenoid and motor valves, to provide close temperature control of a wide variety of furnaces, plastic molding machines, and other heating equipment.

Controllers are equipped with a recently developed millivoltmeter mechanism, and are of unit plug-in construction. Basic model can be used for low-open, high-open, and low-high control. One model with an additional plug-in unit permits proportional current input to provide straight-line control of many heating appliances.

All units are available with thermocouple fail-safe protection in case of thermocouple burn-out or other failure. Temperature ranges are from 400 to 3000 F.

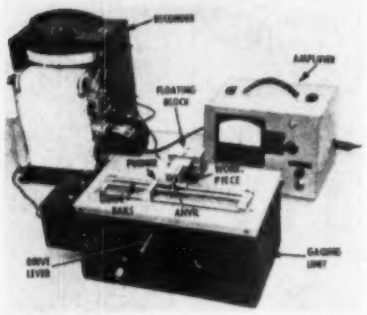
The Bristol Co, Waterbury, Conn

Chatterproof Valve

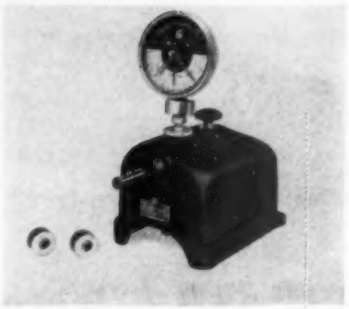
Quick-release valve, said to be chatterproof, is designed to handle air pressure from 0 to 250 psi on pneumatic clutches up to 1500 hp.

Light weight permits use on rotating elements without disturbing dynamic balance. Built-in orifice prevents accidental removal of orifice from the line and eliminates any chance of pressure equalization. Quick releasing action is assured through double-piston design.

Deublin Co, 1155 Waukegan Rd, Glenview, Ill.



SPECIAL GAGING EQUIPMENT was developed for inspection of cylindrical pins, diameter of which had to be checked at four points to ± 0.000005 in. Measuring element consists of a Cleveland Micro-Ac gage head and amplifier. With workpieces of 2-in. length, equipment gages up to 120 pieces per hour–*Cleveland Instrument Co, 735 Carnegie Ave, Cleveland, Ohio*



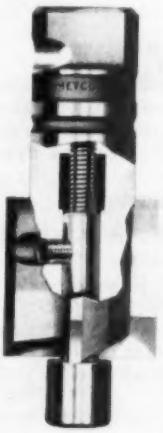
Air Gage With 10,000 X Uses Standard Gaging Plugs

New air gage is available, called Air-O-Limit Model G comparator.

Magnification is obtained by a recently developed amplifying unit used in conjunction with an adjustable restriction and large indicating dial. Unit is furnished with either a 10,000 X magnification (full scale equals 0.0008 in., each division equals 0.000010) or a 5000 X (full scale equals 0.0016 in., each division equals 0.000020).

Comparator is equipped with a 5-in.-dia dial with linear graduations increased to 180° and arc length of 8 in. for easier reading. Standard gaging plugs are adequate.

Pratt & Whitney, Div Niles-Bement Pond Co, West Hartford, Conn



Metcut Counterbore Reduces Carbide-Tip Failure

Pin-drive carbide-tipped counterbore has been designed with a new back-up screw inserted from the drive end to prevent movement of the pilot toward the carbide tips.

Standard short pilot, usually found in stub taper drive tools, is substituted for the conventional long pilot with threaded end and nut.

Metal Cutting Tools, Inc, 301 S Water St, Rockford, Ill

Ask your Distributor

From rough steel to finished taps, holding to highest standards of quality is an unbroken rule in Butterfield production.

We'll welcome your visit to Booth #806 at the Triple Mill Supply Convention in Miami, April 14th

BUTTERFIELD

Union Twist Drill Company ***Butterfield Division*** *Derby Line, Vermont, U. S. A.*

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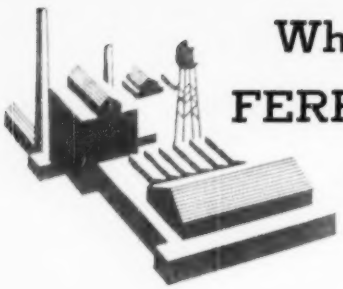

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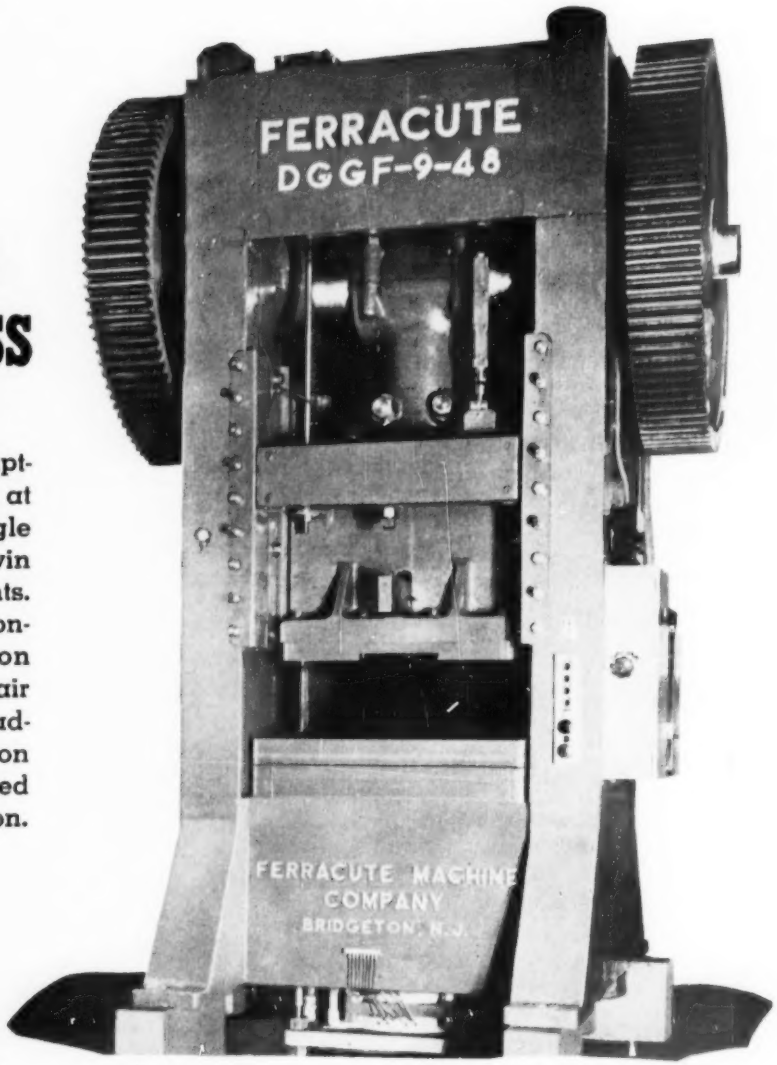
350-ton BLANKING and DRAWING PRESS

Ferracute No. DGGF-9-48

Highly versatile, highly adaptable. 350-ton press operating at 20 strokes per minute. Single Crank, Double Geared, Twin Driven 48" between uprights. Air operated, electrically controlled, combination friction clutch and brake. Slide, air counterbalanced—motorized adjustment. Automatic lubrication throughout. Controls mounted for convenience of operation. Bed mounted die cushion.



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FREE Catalogs, Booklets, Charts, Calculators

FYI—these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 LATHES—*Cincinnati Lathe & Tool Co, Cincinnati, Ohio.* 46-page manual S-104 covers installation, operation, lubrication, and exploded view parts listings for model LT Cintilathes. Request on company letterhead.

2 DIE FINISHING MACHINES—*Wm K Stamets Co, Pittsburgh, Pa.* 4-page illustrated bulletin 100-E describes operation and construction of units for boring and grinding of tube-reducing dies. Specifications table included.

3 SCRAP BUNDLER—*McLanahan & Stone Corp, Hollidaysburg, Pa.* 4-page illustrated folder contains technical details, operating data, and dimensional drawings.

4 VERTICAL CHUCKING GRINDERS—*The Bullard Co, Bridgeport, Conn.* 7-page circular contains illustrated information on models available in six sizes for grinding larger sizes of work. Diagram and specification table included. Request on company letterhead.

5 MULTI-SLIDE MACHINES — *US Tool Co, Inc, Ampere, NJ.* 10-page illustrated folder contains detailed data on automatic unit for production of stampings. Applications and principles of operation, specifications, special attachments and equipment included.

6 LATHE—*South Bend Lathe Works, South Bend, Ind.* 4-page bulletin 5303 illustrates and describes 16-in. 12-speed unit. Design features, specifications, and prices provided.

TOOLS AND ACCESSORIES

7 CUTTING TOOLS — *Morse Twist Drill & Machine Co, New Bedford, Mass.* 303-page revised catalog 37 covers application and usage. Revised technical and tabulated data is double-indexed. Contains new tap section and complete information on Unified Thread tolerances.

8 MAGNETIC CHUCK — *Sundstrand Machine Tool Co, Rockford, Ill.* 5-page folder contains illustrated information on Power-Grip chucks for heavy-duty and production milling, production and general grinding operations. Ordering information included.

9 DIAL INDICATORS—*Taylor Instrument Companies, Rochester, NY.* 24-page bulletin 98214 illustrates and describes units for temperature, pressure, and load applications. Data on features, dials, scales available, and different types of actuation.

10 CLAMPING TOOLS—*Wilton Tool Mfg Co, Chicago, Ill.* 28-page revised catalog 100 contains illustrated information on complete line of vises, clamps, work positioners, and other hand tools.

11 DIAPHRAGM CHUCK—*Sheffer Collet Co, Traverse City, Mich.* 6-page catalog illustrates Super-Grip air pressure unit. Operational and design data, and applications given.

12 HOLE PUNCHING UNITS—*Wales-Strippit Corp, North Tonawanda, NY.* 31-page illustrated catalog BL fully describes units for processing mild steel up to ¼-in. thick. Data on various setups and accessories provided, plus specified stripping guide.

13 PORTABLE POWER SAW—*Skil Corp, Chicago, Ill.* 24-page manual on cutting applications and best methods for processing 30 different materials. Information includes blade selection and techniques, and suggestions.

14 HARDNESS TESTER—*Ames Precision Machine Works, Waltham, Mass.* 20-page illustrated catalog covers line of portable units. Procedure and method details, Rockwell chart, description of accessories and equipment provided.

15 TOOLS—*Heinrich Tools, Inc, Racine, Wis.* Brochure contains illustrated catalogs on line including hand-operated nibblers, shears, rod cutters and punches, screwless and screwtype drillpress vises, and screwless fixture locks.

HEAT-TREATING AND WELDING

16 ARC-WELDING ACCESSORIES—*Westinghouse Electric Corp, Pittsburgh, Pa.* 12-page booklet B-5451 illustrates extensive line ranging from electrode holders to protective headgear. Specification data and special applications included.

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FOR YOUR INFORMATION

17 CHILLING UNITS—*Sub-Zero Products Co, Cincinnati, Ohio.* 12-page brochure on alloy steel heat-treatment, metal stabilization, parts and materials testing. Units illustrated and specified.

18 RESISTANCE WELDING — *Amco Metal, Inc, Milwaukee, Wis.* 24-page bulletin RW-1a contains full information on Ampco-Weld line. Reference tables and charts give physical properties, applications, and specification data.

19 TEMPERATURE AND CONDUCTIVITY CONTROLLERS—*Leeds & Northrup Co, Philadelphia, Pa.* 20-page catalog ND47 contains complete illustrated data on electronic instruments for two-position or proportional control. Diagrams and specifications provided.

PLANT-SERVICE EQUIPMENT

20 FLUORESCENT LAMP BALLASTS —*General Electric Co, Schenectady, NY.* 16-page bulletin GEA-4950E contains pictures and wiring diagrams of range of equipment. Frequency problems and operating temperatures covered.

21 RUST PREVENTIVE — *Production Specialties, Inc, Boston, Mass.* 8-page booklet on Rust-Lick water soluble rust-preventive compounds. Specific applications listed, directions, effects, and prices included.

22 CONVEYOR BELTS — *Cambridge Wire Cloth Co, Cambridge, Md.* 132-page illustrated catalog on woven wire belts contains complete indexed information on belting, including conveyor design, layouts, applications, and engineering data.

23 FINISHING SYSTEMS—*Cincinnati Cleaning & Finishing Machinery Co, Cincinnati, Ohio.* 16-page illustrated catalog covers integral and unitized systems. Applications and processes are outlined, as well as installation case histories. Request on company letterhead.

24 FANS—*Westinghouse Electric Appliance Div, Springfield, Mass.* Catalog 3FN-0301 covers and illustrates complete line of table, wall, pedestal, hassock, ventilating and exhaust units.

25 PAINT STRIPPING—*Octagon Process, Inc, Staten Island, NY.* 13-page booklet describes procedures for using 11 types of strippers to remove any finish from all metals. Wipeon, immersion, and spray removal methods covered.

26 CONVEYORS — *Standard Conveyor Co, North St Paul, Minn.* 16-page bulletin 68 illustrates conveyor installations and pneumatic tube systems for wide range of applications.

PARTS AND MATERIALS

27 COLMONOY CASTINGS—*Diamonds & Tools, Inc, Detroit, Mich.* 6-page folder describes standard castings such as lathe and grinder center tips, chuck jaw inserts. Special castings illustrated include wear strips and pads, machine gibs, etc.

28 GEAR WIRE FORMULA—*Size Control Co, Chicago, Ill.* Catalog 53 gives complete information on single mathematical formula to figure correct wire sizes for both spur and helical gears. Can be used for quality control and maintenance accuracy.

29 PRESSURE BLOWER—*Eclipse Fuel Engrg Co, Rockford, Ill.* 7-page catalog K-100 illustrates and describes centrifugal units, using pressure up to 2 lb or as low as 2 oz. Design, dimensions and specification tables provided.

30 CARBON STEELS—*Peter A Frasse & Co, New York, NY.* Chart shows chemical analysis requirements for each of 60 Military and Federal specifications. Specified forms, sheets, bars, etc., are also listed, and nearest corresponding SAE, AISI, and AMS type numbers.

31 COPPER AND BRASS—*Chase Brass & Copper Co, Inc, Waterbury, Conn.* File-size bulletin lists 70 catalogs and technical handbooks on copper and brass, covering extensive range of subjects.

32 DESEGATIZED TOOL AND DIE STEELS—*Latrobe Steel Co, Latrobe, Pa.* 9-page booklet describes steel uniformly free from carbide segregation.

33 HYDRAULIC CYLINDERS — *The S-P Manufacturing Corp, Cleveland, Ohio.* 10-page catalog 103 illustrates 11-model line. Includes dimension table and extensive pressure and flow data in tabular form. Request on company letterhead.

34 ASSEMBLY ROLLER CHAIN—*Baldwin-Duckworth Div, Chain Belt Co, Springfield, Mass.* 23-page bulletin 52-2 illustrates and describes riveted chain to be assembled to any length. Diagrams, charts, applications, list prices and specifications included.

35 MAGNETIC MOTOR STARTERS—*Arrow-Hart & Hegeman Electric Co, Hartford, Conn.* 8-page illustrated folder describes RA-V starters with vertical overloads below contactor. Applications, design features, dimensional data provided.

36 CUTTING FLUIDS—*The Pure Oil Co, Chicago, Ill.* 16-page booklet on selection includes testing procedures, care of tools, machinability tables, cutting techniques, tool angles, and application methods.

37 GEAR COUPLINGS — *Sier-Bath Gear & Pump Co, Inc, North Bergen, NJ.* 16-page catalog C4 illustrates flexible units. Information on advantages, applications, standard and special types, and engineering data included.

38 PUMPS—*Pioneer Pump & Mfg Co, Detroit, Mich.* 8-page bulletin 160-26 describes complete line. Centrifugal units for coolants, cutting oils, etc, illustrated with typical installations. Positive displacement pumps for lubricating oils are shown, with application pictures.

39 VALVES—*Ledeen Mfg Co, Los Angeles, Calif.* 15-page illustrated bulletin 1000 describes line used for operating air and hydraulic cylinders, single and double acting, and air motors. Operating and circuit diagrams and dimensional data provided.

MISCELLANEOUS

40 TURBINE-GENERATORS — *Westinghouse Electric Corp, Pittsburgh 30, Pa.* 20-page booklet B-5418 illustrates 30 applications and describes six principal types of industrial turbines. Photographs and installation data included.

41 WRENCH REPAIRS — *Utica Drop Forge & Tool Corp, Utica 4, NY.* Pamphlet called "First Aid for Adjustable Wrenches," contains information on proper care and handling of new and undamaged adjustable wrenches to prolong life. Common ailments of long-used units and repair information included.

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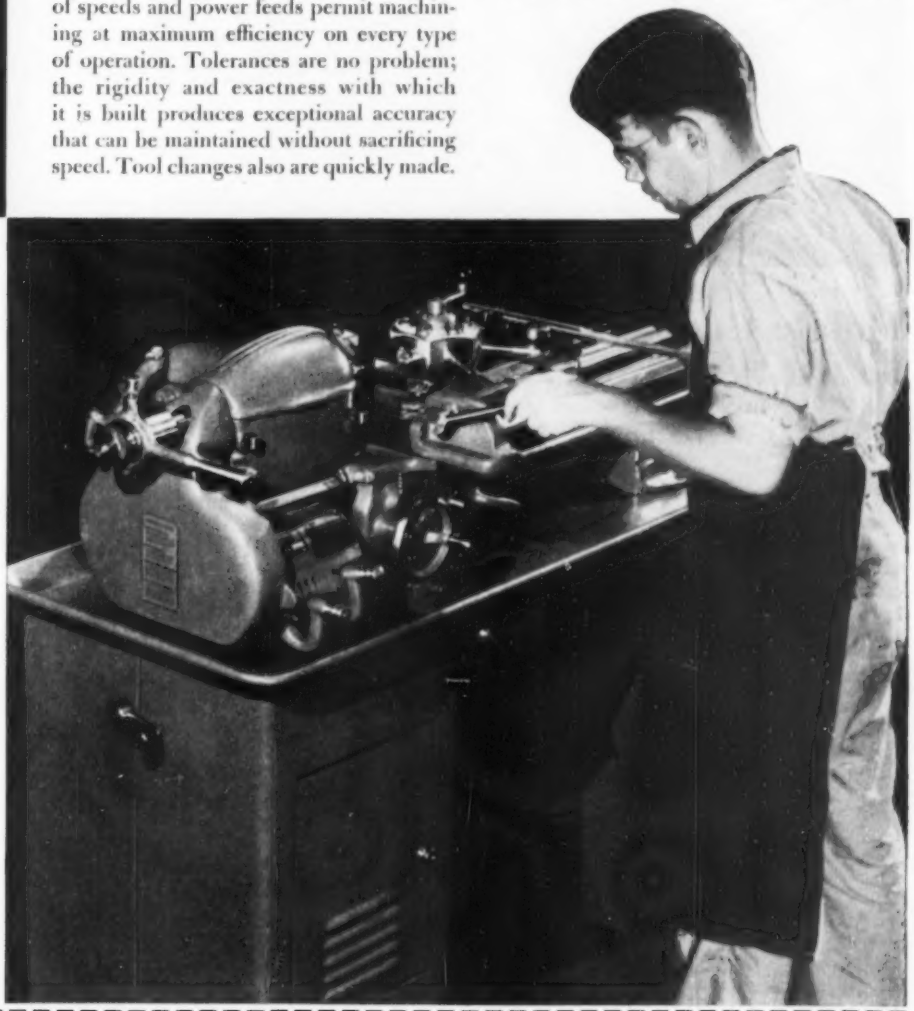
SOUTH BEND 900 TURRET LATHE

Keeps Production UP and Costs DOWN on Precision Parts

Here's the precision turret lathe that has everything needed to consistently and economically turn out volumes of small precision parts.

High output comes easy on the 900 Turret Lathe. It's fast and simple to handle—operator fatigue is less. Wide ranges of speeds and power feeds permit machining at maximum efficiency on every type of operation. Tolerances are no problem; the rigidity and exactness with which it is built produces exceptional accuracy that can be maintained without sacrificing speed. Tool changes also are quickly made.

It is these advantages, that keep production up and costs down, which also make this turret lathe perfect for second operations. If output and tolerances are problems on any small parts you are producing, it will pay you to find out about the 900 Turret Lathe. *Send coupon for information.*



SPECIFICATIONS

Collet Capacity—½"

Spindle Bore—¾"

Swing—9¼" over bed, 3-9/16" over double tool cross slide, 5½" over compound cross slide.

Turret to Spindle Distance—20⅜"

Spindle Speeds—12; 41 to 1270 r.p.m.

Power Longitudinal Feeds—48

Power Cross-feeds—48

Thread Cutting—48 pitches R. H. or L. H. 4 to 224 per inch.

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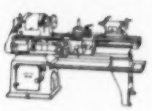
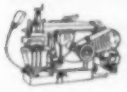
☐ 9" and 10" BENCH LATHES



☐ 10" to 16-24" FLOOR LATHES

☐ ½" and 1" Collet TURRET LATHES

☐ 14" DRILL PRESSES



☐ 7" BENCH SHAPERS

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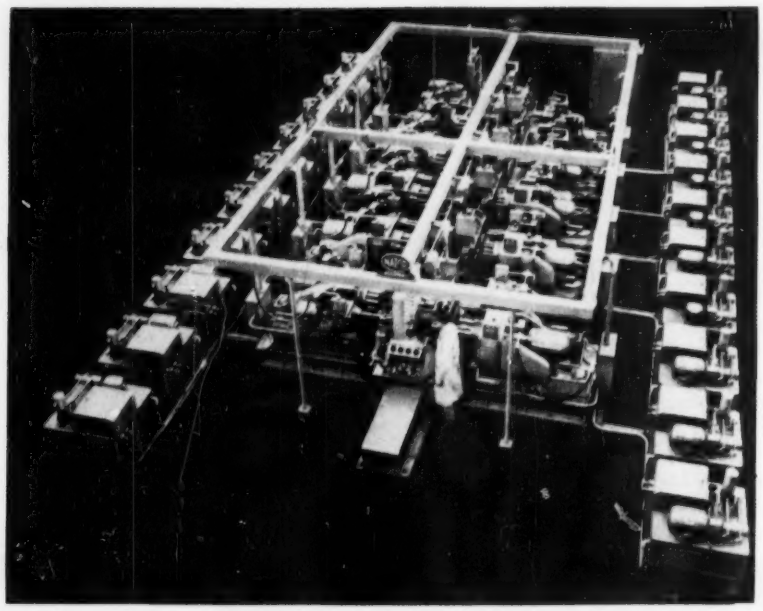
Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana



Mobile Hydraulic Power Units Speed Processing Operations

Natco Holeway automatic processing machine incorporates the company's new mobile hydraulic power units for high continuity of production. In addition to providing fast replacement for minimum downtime, quick accessibility for adjustment or repair results in lower maintenance cost.

Production is said to be 100 parts per hr; unit completes 102 operations automatically on each engine block in 6/10 of a minute, including drilling, combination core drilling and counterboring, chamfering, combination ream and chamfer, and combination ream and counterbore, trepan and ream.

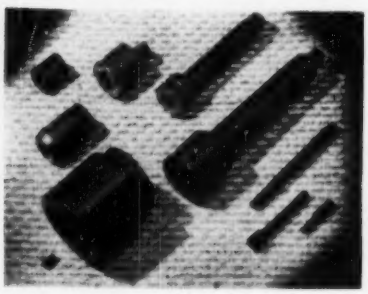
National Automatic Tool Co, Inc, Richmond, Ind

Clark Steel Casters and Wheels

Clark fabricated steel casters and wheels, said to be unbreakable, are available in a wide range of capacities with sealed swivels and bearings.

Tires may be ordered in steel, rubber, composition, oil-resistant, static-conductive, or plastic. Straight, roller, ball, or tapered roller bearings are optional.

All Steel Welded Truck Co, Rockford, Ill



Power-Impact Tools

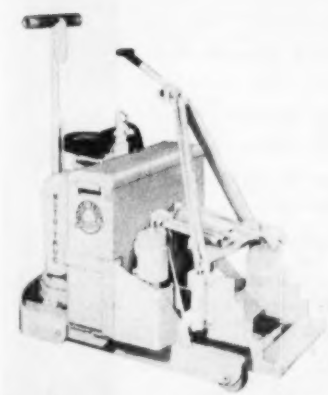
Complete line of power-impact sockets, extensions, adapters, and drivers has been introduced for use with Ingersoll Rand, Chicago Pneumatic, Independent Pneumatic, or any other standard air or electrically powered tool.

Sockets are available in square or hexagonal openings for nut sizes ranging from 3/16 to 3½ in. with drive sizes from ¼ to 1½ in.; can be furnished in both standard and deep lengths. Extensions are available from ¼- to 1½-in. drive sizes in a wide range of standard lengths. Adapters are obtainable to permit interchanging of sockets with other drive sizes of impact power tools. Tools are machined to SAE and ASA tolerances.

The Cornwell Quality Tools Co, 1004 Cleveland Ave, Mogadore, Ohio

Interference process equipment for examination of surface finish consists of a Reichert Universal Camera Microscope Model MeF, and instrument, in one integral unit. Degrees of irregularities of the surface of the order of 1/10 to 1/20 of the wavelength of light can be determined. Equipment used in conjunction with Reichert metallographs permits operator to perform all known methods of examination.

William J Hacker & Co, Inc, 82 Beaver St, New York, NY



Grip-All Tractor Has Hydraulic Clamping Design

Moto-Truc Grip-All tractor is designed for moving 4-wheel trailers or containers. Electric-hydraulic clamp grips all types of units. Lower toothed clamp can be adjusted in or out, depending on position and height of container or hitch; upper clamp comes down and grip is completed.

Available with either a 12- or 18-v battery; overall dimensions are 27 in. wide by 48 in. long; drawbar pull is approximately 700 lbs.

The Moto-Truc Co, 1974 E 59th St, Cleveland, Ohio

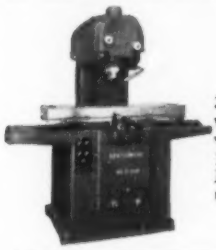
CUT MILLING COSTS WITH

KENT-OWENS

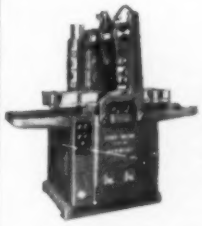
Speed and Accuracy!

No. 2-20
20" table travel . . . 42" x 12" table . . . full automatic hydraulic table feed.

More and more—Kent-Owens Machines get the call for countless milling jobs today—because they're *rugged* . . . *simple* . . . *versatile.* Twin-post head mounting assures balanced load. Greater cutting efficiency—only two gear contacts, motor to cutter. Write for bulletins on wide range of hydraulic and hand-operated machines. Also, let our engineers help you with tooling and special machine requirements. Kent-Owens Machine Co., Toledo, Ohio.



No. 2-20V
20"table travel... vertical spindle with speed range 32 to 1284 R.P.M. . . . 42" x 12" table.



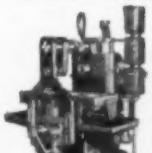
No. 2-20DS
Double Spindle for two milling operations at same time . . . 20" table travel . . . 42" x 12" table.

No. 1-14DS
Double Spindle for two milling operations at same time . . . 14" table travel . . . 32" x 9" table.

No. 1-M
Hand feed to table and head . . . 25" x 9" table . . . Adjustable head counter-balance.

No. 1-V
Hydraulic vertical head feed . . . 5½" head travel . . . 25" x 9" table.

No. 1-8
8" table travel . . . 25" x 9" table . . . automatic hydraulic table feed.



No. 1-14
32" x 9" table . . . 14" table travel . . . hydraulic table feed . . . full automatic cycle.

Call on KENT-OWENS for milling machines

KENT-OWENS REPRESENTATIVES

BOSTON
General Machinery Corp.

BUFFALO
Don W. Patterson

CHICAGO
Four States Mach'y Company

DALLAS
Hoover Machine Tool Co.

DAYTON
Geniger Mach'y Company

DETROIT
A.C. Haberkorn Mach'y Co.

FT. WAYNE
Ottis Machinery Co.

GRAND RAPIDS
Joseph Mondloch

HAMILTON, ONT.
F. F. Barber Mach'y Company

HARTFORD
Harrington Machinery, Inc.

HOUSTON
Oliver H. Van Horn Co., Inc.

INDIANAPOLIS
Ottis Machinery Co.

KANSAS CITY
Richman Machinery Co.

LOS ANGELES
Boehm & Swanson Mach'y Co.

MILWAUKEE
Four States Mach'y Company

MINNEAPOLIS
The Butterfield Company

MOLINE
John J. Normoyle Co.

MONTREAL
F. F. Barber Mach'y Co.

NEW ORLEANS
Oliver H. Van Horn Co., Inc.

NEW YORK
Harrington-Wisbon-Brown Company

PHILADELPHIA
Ottis Machinery Company

PITTSBURGH
Bussey Machinery Company

ROCHESTER
F. W. Schiefer Machinery Co.

SAN FRANCISCO
C. F. Bulony Machinery Co.

ST. LOUIS
Blackman & Nauteul Mach'y Co.
Clarke Equipment Company

SYRACUSE
J. S. Owens Mach'y Company

TORONTO, ONT.
F. F. Barber Mach'y Company

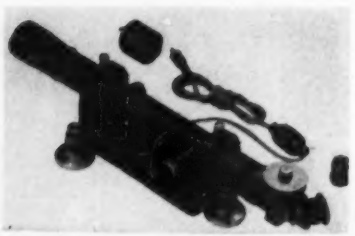
WALKERVILLE, ONT.
F. F. Barber Mach'y Company

Portable Fire Extinguishers Have Squeeze-Type Valves

Line of portable carbon dioxide fire extinguishers, called Fyre-Freez, has squeeze-type valve, and is available in 2½-, 5-, 10-, 15-, and 20-lb models. Units are lower in price than the company's trigger-operated line.

Valve requires only normal hand pressure to actuate extinguisher after safety pin has been removed. Flammable liquid and electrical equipment fires are said to be smothered in seconds. Gas is non-corrosive, and a non-conductor of electricity; it is eventually absorbed into the atmosphere following discharge.

Walter Kidde & Co, Inc, Fyre-Freez Div, Belleville, NJ

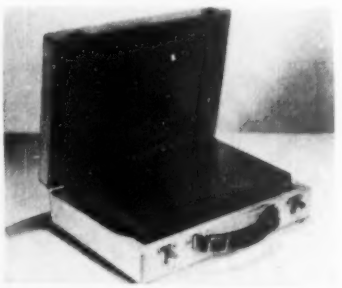


Improved Auto-Collimator for Surface-Plate Measurements

Improved microptic auto-collimator tests straightness, squareness, and parallelism to 0.0000025 in. per in. The instrument is said to be the equivalent of an independent super-precision level, free from effects of temperature change, normal shop vibration, or wear. Readings can be obtained comparable to a level of 40 times the normal accuracy, and in any plane—horizontal, vertical, or inclined. With use of an optical right-angle accessory, checks can be made in a direction perpendicular to its own axis.

New unit has 4-v illumination with a 12-ft cord, switch, and plug, and transformer for standard light outlets. Improved filter produces sharper, clearer readings. A circular bubble in the base permits quick leveling where necessary. An improved scale speeds determination of inclinations in two perpendicular planes without rotating the instrument in its bearing.

Engis Equipment Co, 431 S Dearborn St, Chicago, Ill

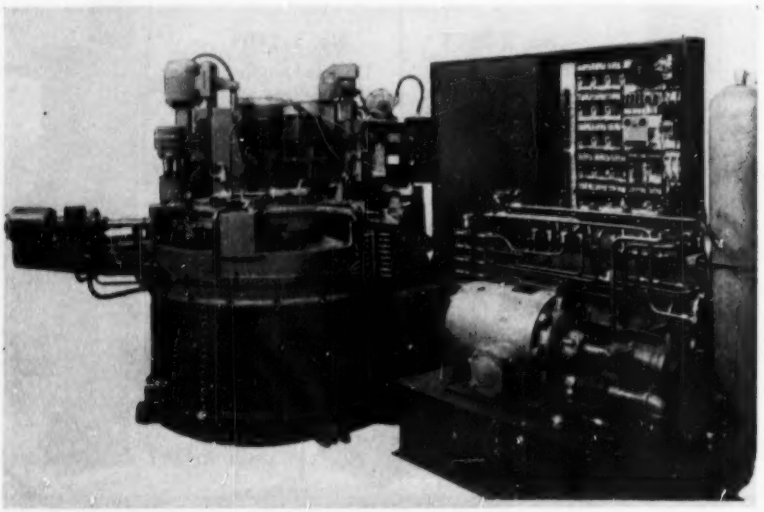


Portable Surface Plate

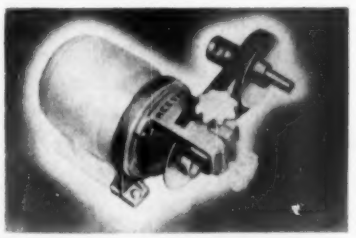
Velsey Ultra-Flat portable granite surface plate is of four-lip design, measures 8x12x2½ in. Overall surface accuracy is 0.000025 in.

Plate, in black or red granite, and hardwood case, weigh 20 lb.

The Elkro Co, 736 Albany St, Dayton, Ohio



SEMI-AUTOMATIC 8-STATION MACHINE assembles 280 oil pumps in one hour. Pump body is automatically clamped into place; hopper feeds in the idler gear shaft and presses it into position. After automatic check for proper alignment, it is either accepted or rejected. Dowel pins are hopper-fed into position and pressed in. Operator inserts the idler gear, drive shaft, and gear assembly, and places gasket. After pump is covered and four screws started, cover screws and pressure relief valve nut are automatically driven and torqued. When these operations are completed, machine unclamps pump, and it is ready for removal by operator at original station.—*Douglas Tool Co, 2300 E Nine Mile Rd, Hazel Park, Mich*



Variable Speed Drive Designed For Flexible Mounting

Reeves variable Flexi-Speed drives may be mounted in almost any position around the driven equipment, drive in any direction, and deliver any desired speed within a ratio of 8 to 1.

Driven shaft may be located anywhere around the motor shaft; speed control handwheel may be parallel to, or in any of eight positions perpendicular to the motor shaft. Six different length belts offer a wide range of shaft center distances.

Available in ½-, ¾-, and 1-hp capacities, units are adaptable to all industrial applications, including those with in-line or right angle reducers, countershafts, chain and sprocket, or V-belt drives.

Reeves Pulley Co, Columbus, Ind

From DIRT FLOORS to 1,000,000 SHELLS

IN TWENTY-TWO MONTHS

In six months Thor Corporation readied an abandoned, dirt-floored foundry for full production of 105 mm shells. Sixteen months later, the company delivered its one-millionth shell to U. S. Army Ordnance.

We're proud of the part we played in this outstanding achievement.

STAMETS High Speed Shell Lathes are used by THOR Corporation for

- **CUT-OFF and BASE-FACING**
- **ROUGH-TURNING**
- **FINISH-TURNING**

All three types of STAMETS Shell Lathes are available in three standard sizes, to machine shells from 75 mm to 240 mm.

Write for Bulletin No. 100-D, "Stamets Shell Lathes."

Congratulations Thor

WE'RE GLAD WE HELPED

WM. K. STAMETS CO.

PITTSBURGH – CLEVELAND

MACHINE TOOLS SPECIAL MACHINERY

Lindner Thread Grinder Handles Pitch Angles As High As 40°

Thread grinder imported from West Germany permits a maximum adjustment of 40° to create the pitch angle. This is a redesign of an earlier model providing a 10° adjustment (*AM*—Apr 28 '52, p 150). This working range is made possible by providing adjustability of the spindle box as well as the grinding table, on both. The standard machine is suitable for single and multi-profile grinding, and automatic plunge grinding is accomplished by using a lead collet while the leadscrew of the machine is inoperative.

Grinding-wheel diameter is 13.8 in. but the machine can be equipped with smaller wheels for internal-thread grinding and for relief grinding of straight and helically grooved milling cutters.

An oil-fog collector, included in the machine bed, filters the oil-saturated air that results from grinding with oil. The air is exhausted to the back of the machine while the precipitated oil is re-introduced into the coolant-circulation system by means of a pump.

A fixture can be mounted on the grinding table to permit the grinding of thread and profile shapes on flat surfaces. Other special fixtures such as microscope viewers, correcting fixtures, and dividing fixtures (for axial movement of the grinding table) are available.

In addition to the standard machine, Lindner has developed special-purpose machines. Model FS 10 has a workpiece-diameter clearance of 35.5 in. Model GL is capable of grinding leadscrews as long as 118 in.

Imported by Kurt Orban Co, Inc, 205 E 42nd St, New York 17, NY

Metal-Cutting Agent is Water- and Oil-Soluble

Metalloid WOS, a metal-cutting agent functioning on the Dynatomics heat-limiting principle, has been developed by the Metalloid Corp for all machining and grinding operations. It is a solubilized organic condensate containing chlorine, nitrogen, oxygen, and carbon in a complex molecule. Usable with water and oil diluents, the product releases free atoms at the cutting point to keep tool and workpiece cool, eliminate internal stress, and improve surface finish quality. The material is said to be completely safe on silver and silver alloys, non-staining on ferrous and non-ferrous metals except some copper and brass alloys which will discolor slightly if more than twelve hours' contact is allowed.

For general machining operations, surface finish quality and tool life are proportional to the concentration used, the manufacturer claiming possible tool life increase from 200 to 500%. For grinding operations Metalloid WOS reportedly increases wheel life at least 100%, gives 3 to 5 times more pieces per dressing over straight oil, and 10 to 15 times more over other water soluble fluids.

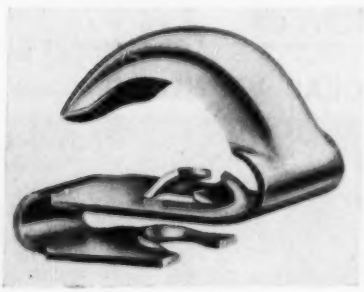
Because their product will make possible the development of advanced tooling procedures, the product is available for test under the supervision of qualified Metalloid personnel who will recommend required tool geometry changes.

The Metalloid Corp, Huntington, Ind

Polishing and Buffing Lathe

Hammond Machinery announces Model 10VRO variable-speed polishing and buffing lathe with a speed range of 1500 to 3000 rpm and a rating of 10 hp. Speed changes are made by turning the dial control while machine is running.

Hammond Machinery Builders, Inc, Kalamazoo, Mich



Shakeproof Speed Nut Shields Point of Screw

Designed for use with automatic automobile seats, the Speed Nut is a variation of a standard J-type with a rigid flap curving over the point of the screw. Prevents snagging of upholstery and provides protection against screw-point scratches.

Shakeproof Division, Illinois Tool Works, St Charles Rd, Elgin, Ill

UTICA'S NEW RIB-JOINT®

Pliers # 507-10

With *FORGED* rib-joint for added strength exactly where you need it.

FULL FORGED RIBS CAN *TAKE* IT!

AND HERE'S WHY:

CROSS SECTION VIEW OF FORGED RIBS SHOWING STEEL FIBRE STRUCTURE
STRONG BECAUSE STEEL FIBRE STRUCTURE IS COMPRESSED AND FORCED TO FOLLOW CONTOUR OF RIBS
EACH RIB SHARES THE SINEW-LIKE STRENGTH OF THE ENTIRE JOINT MEMBER

Full forging of the rib joint is the secret of this new UTICA pliers. Forging makes the steel fibre structure follow the contours of the ribs as shown in the diagram above. Hence, each rib shares the sinew-like strength of the entire joint. There is no weak point, likely to break, with this method of manufacture.

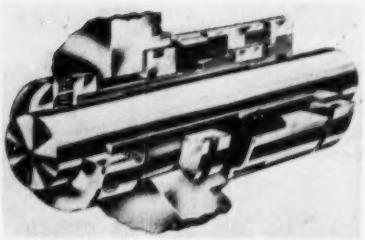
Be sure you see these new pliers! One look, one "heft", and you'll know that they live up to the standard of UTICA® quality.

It pays to use quality tools — U TI CA® — and the world's best tools are made in U.S.A.

DROP FORGE AND TOOL CORPORATION

UTICA 4, NEW YORK

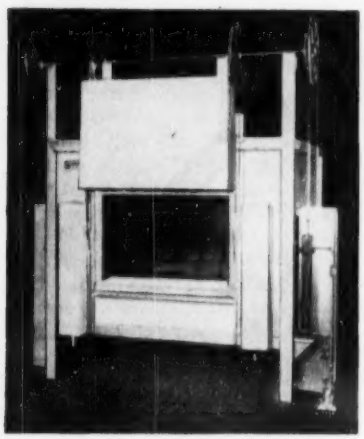
In Canada, ADLAM TOOL & SUPPLY CO., LTD., MONTREAL



Mechanical Seal Withstands Pressures to 1000 psi

Type 8-B shaft seal incorporates a rotating sealing washer and a stationary seat, balance being accomplished by lowering the washer face to a point where stuffing box pressure is not exerted against the sealing area. Mating faces of washer and seat are lapped to 0.0000232 in. A retainer, driven by the sleeve, has dents to enable it to drive the washer. The assembly is held in contact with the seat by multiple springs equally spaced around the sleeve at the back of the retainer. O-rings are used between the sleeve and shaft, between the washer and sleeve, and between the seat and end plate. The compact design adapts it for use in conventional pump stuffing boxes.

The Crane Packing Co, Dept A-18, 1800 West Cuyler Ave, Chicago 13, Ill

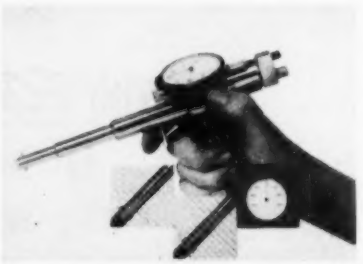


Pereco Electric Furnace Treats 350 lb of Metal per Hour

Model TF-24 electric furnace operates at 2400 F with a workload of 350 lb of metal per hour. Suitable for porcelain enameling as well as a variety of heat-treating operations, chamber size is 36 in. wide by 48 in. deep by 24 in. high while the overall size of the unit is 77x71x80 in. The hearth is constructed of SiC solid tile or triangular rails. It is heated by Globar elements running front-to-back on each side of the chamber. The door is counterbalanced and operated by a foot-controlled air cylinder.

The unit is powered by 60-kw, 440-v, 60-cycle, 3-phase supply. The voltage-regulating transformer has a 60-kva rating, 36 taps, and a direct-reading, power-input meter. Suitable loading-fork attachments are available.

Pereny Equipment Co, 893 Chambers Rd, Columbus 12, Ohio

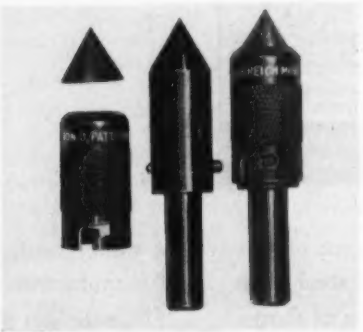


Groove Gage for Small Diameter

Rimat's new line of P gages includes models small enough to enter a 0.310-in. bore, and measure groove diameters for O-ring AN6227-6, and snap ring groove NAS-50-31.

The lightweight gage is particularly suited to measurement of thread reliefs, bypass reliefs in hydraulic mechanisms, and small bores.

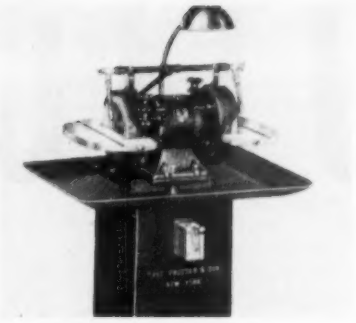
Rimat Tool Co, 21 West Dayton St, Pasadena, Calif



Reich Abrasive Center Laps

Cent-R-Lap tools have an abrasive cloth cone which fits over the mandrel and can be changed while the lap is still locked in the chuck. The cones are formed with a curved seam designed for lapping without chatter. Mandrels are machined to a 60° angle. Cent-R-Lap tools with nonrusting blue-black finish are made in ⅜- and ¾-in. sizes.

The J R Reich Mfg Co, Dept B, 45 E Stroop Rd, Dayton 9, Ohio



Prosser Carbide Grinder For Wet Grinding

Model AW wet grinder embodies all the features of the Prosser model AA grinder (*AM*—Dec 22 '52, p162). In addition, the machine is provided with a separate motor-driven coolant pump, pan, settling tank, piping, valves, nozzles, and spray guards, and delivers a heavy flow of water directly to the tool being ground. All types of grinding wheels, diamond wheels, and accessories are available. The machine is equipped with a ½-hp motor, either 110-v ac or 220/440-v, 60-cycle, 3-phase supply.

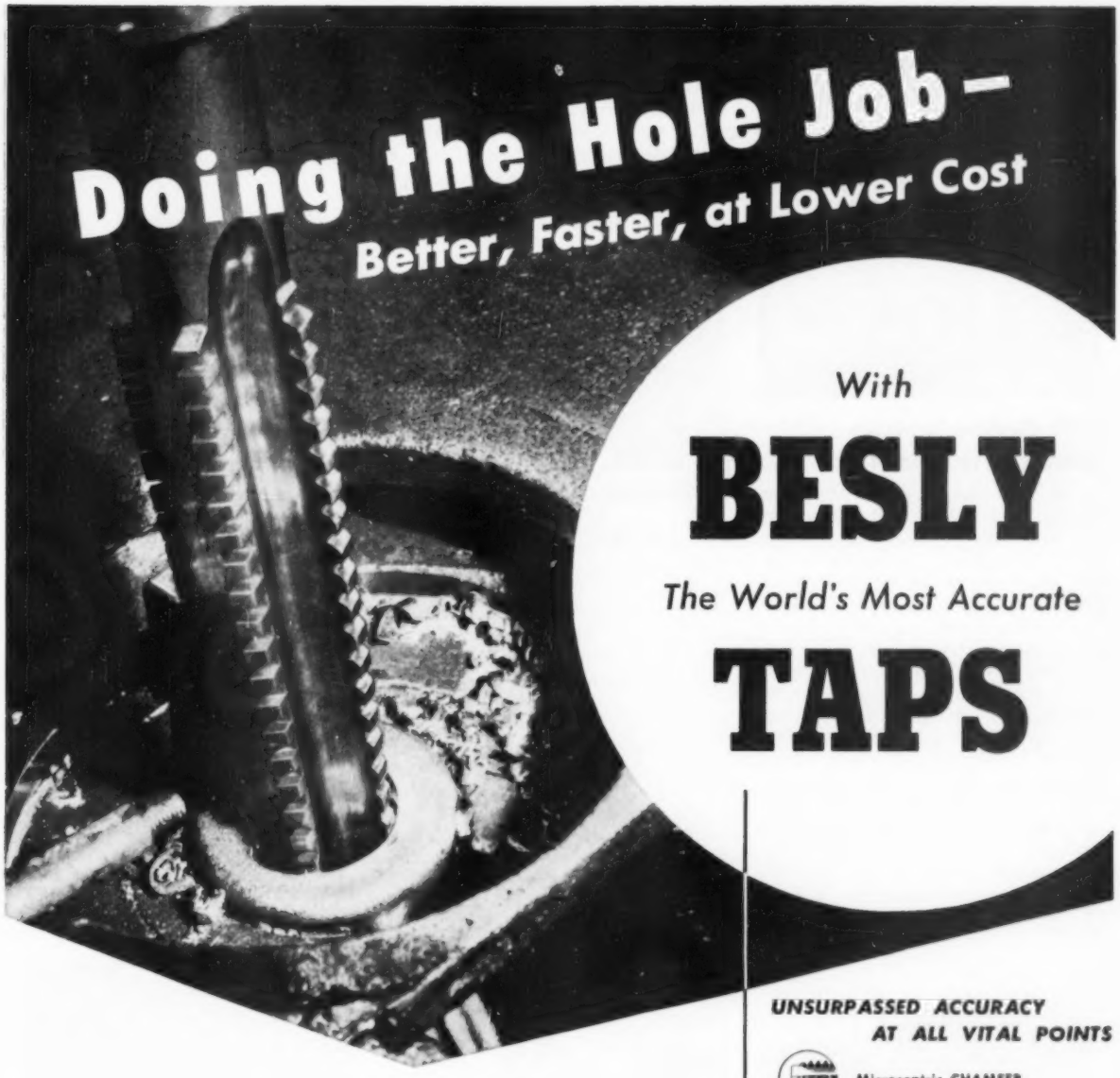
Thomas Prosser and Son, 120 Wall St, NY 5, NY

Brennen Portable Unit Welds Bandsaw Blades

Portable bandsaw blade welder, fully automatic, is designed to butt-weld all blades from 1/16 to ¾ in. It is said that it will reduce filing time by cutting close to the line and that its welding facility and simplified controls allow operation by inexperienced personnel. Construction includes copper welding jaws, built-in grinder, and a double gage for checking weld thickness. Machine operates on standard ac. Dimensions are 7¾x12x7 in. Weight is 31 lb.

Brennen Mfg Co, 676 59th St, Brooklyn 20, NY

Doing the Hole Job—
Better, Faster, at Lower Cost



With

BESLY

The World's Most Accurate

TAPS

UNSURPASSED ACCURACY AT ALL VITAL POINTS

- Microcentric CHAMFER
- Solid-Ground THREAD FORM
- Accurate RAKE ANGLE
- Mirror-finish FLUTES
- Tru-Square DRIVER

● LET US PROVE that Besly can help you get better threaded parts, longer tap life and lower tapping costs. Ask your authorized Besly Distributor for a TRIAL RUN on your toughest jobs . . . PLUS details on Besly's Super-Service on "Specials".

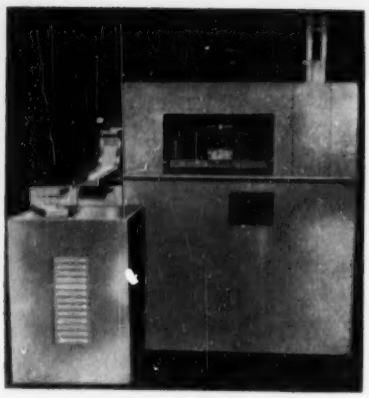
TAP TIPS The handy "Handbook for Tap Users" is full of information on tapping methods and tap selection. Write for your free Copy.

BESLY DRILLS, REAMERS AND END MILLS— High-Speed Cutting Tools in a complete range of types and sizes.

BESLY-WELLES CORPORATION

Established as Charles H. Besly and Company in 1875

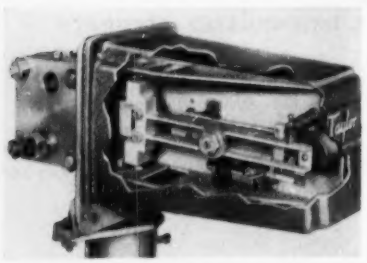
114 DEARBORN AVE. • BELOIT, WISCONSIN



DBM Machine Embosses, Notches, Inks Metal Tags

DBM Databosser, completely automatic, embosses metal addressing plates or property identification tags and simultaneously notches plates for classification, loops wire through tag-holes, and inks the embossed characters. Plates are embossed and filed into the hopper tray at the rate of 90 per min. The unit was developed by Dashew as part of its Positive Identification Control system which includes the use of special-formula metal plates and the Dashawriter 66 for marking plates. The latter is a fountain-pen-like instrument containing a fluid which will not rub or wash off the plate, but can be erased.

Dashew Business Machines, Inc, 847 N La Cienega Blvd, Los Angeles 46, Calif



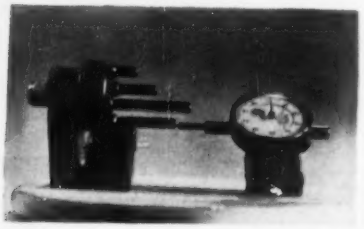
Transaire Transmitter Measures Liquid Level and Fluid Flow

Taylor Instrument announces unit for installations requiring differential pressure measurement and transmission. It can be used to measure flow of liquid, steam, or gas, or to determine liquid level or specific gravity.

The sensing element is a Teflon-coated, glass-fabric diaphragm enclosed in stainless-steel housing. It has an over-range protection of 1500 psi in either direction. The pneumatic force-balance transmitter converts differential pressure into an equivalent 3 to 15 psi output. This unit is enclosed by a gasketed, cast-aluminum cover.

Transaire transmitter is available with carbon steel (SAE 1020) or Type 430 stainless body and Type 430 stainless internal parts.

Taylor Instrument Companies, Rochester 1, NY



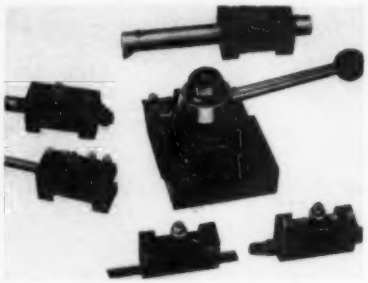
Dial Indicator

Multi-stop long range indicator has been designed to obtain repeatable accuracy of 0.005 on engine lathes.

Indicator holder is mounted on carriage of the lathe; dial head, with pins of adjustable length, is mounted on way of the lathe, near the headstock.

Dial indicator is set to zero after facing the piece. Depths of shoulders, undercuts, chamfers, recesses, etc, are then read on the dial with reference to faced surface, permitting machining without resort to a scale, gage blocks, or dividers.

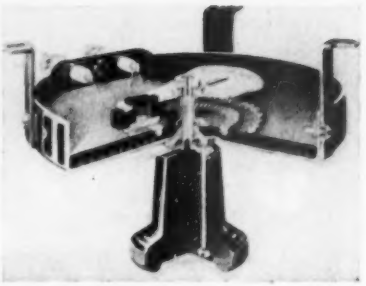
Claremont Instrument Co, 7809 South Claremont Ave, Chicago, Ill



Lathe Toolpost With Interchangeable Holders

Toolpost comes with five interchangeable toolholders for turning, threading, drilling, cut off, and boring. Holders are changed by sliding one out and slipping another into the original pre-set position. A stud screw is provided for precision height adjustments. Made in three sizes ranging from ¼- to 1-in. toolbit capacity and ¼- to 1½-in. boring bar capacity.

Aloris Tool Co, Inc, 80-82 Fourth Ave, NY, NY

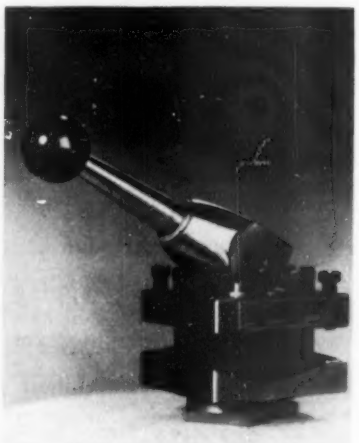


Vitrohm Rheostats

Bulletin 60A rheostats are announced by Ward Leonard Electric Co. Featuring lower operating torque and more control steps than previous designs, standard and multi-step types are available in 6-, 8-, and 13-in. dia with max summation watt ratings of 330, 450, and 1000 respectively. Control steps per plate range from 41 to 161.

Design features include: balanced contact arm keyed directly to the drive shaft, self-lubricating bushing and graphitized movable contact shoe, solid rectangular stationary contacts, reflexed collector ring to supply a self-cleaning surface. Vitrohm enamel permanently seals the resistance element, stationary contacts, and collector ring in position, affording protection against mechanical shock and vibration.

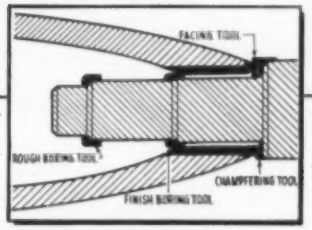
Ward Leonard Electric Co, 115 MacQuesten Pkwy South, Mt Vernon, NY



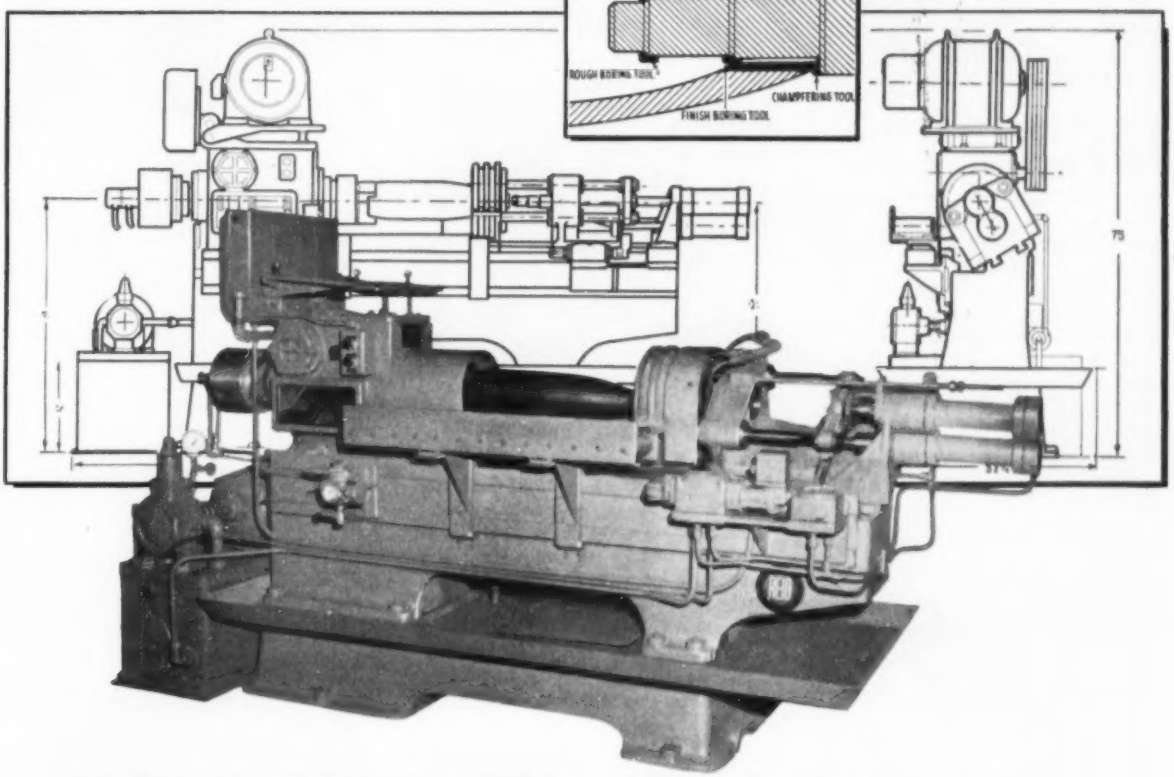
TURRET TOOLHOLDER repeatedly indexes to within 0.0005 of original setting. Equipped with a safety cam handle, time saver for indexing, and rocker arms for shim-elimination. Available with alternate rocker arms and solid rests for carboloy tools. *—Claremont Instrument Co, 7809 S Claremont Ave, Chicago 20, Ill*

70 155 mm. shells hr.*

REID'S 9-inch production lathe performs the *bore nose, face* and *chamfer operation* on seventy 155 mm. shells per hour, net.* For other 155 mm. operations, net production is: face base, 60/hr.; band-seat grooving, 45/hr.; turn and trim copper band, 45/hr.



Sectional close-up of bore, face and chamfer operation



This equipment, the result of REID's more than fifty years' experience in engineering and manufacturing, will increase the efficiency of *your* production line. The REID lathe can be tooled to meet requirements of most production jobs. If you are engaged in shell turning, cartridge case finishing, or other turning, it will pay you to visit a REID installation.

For further details and complete specifications, write for the REID production lathe bulletin.

- ✓ Timken roller-bearing-mounted spindle driven by cone worm designed to accommodate up to 35 h.p.
- ✓ Pneumatic chucking.
- ✓ Tool slides with flame-hardened ways.
- ✓ Hydraulic operation 3-5 h.p. self-contained hydraulic unit.
- ✓ Magnetic braking.
- ✓ Coolant pump: direct drive; ¾ h.p. unit.
- ✓ Automatic lubrication by Alemite
- ✓ Oil-Mist System
- ✓ Conveyor equipped — eliminates all lifting by operator
- ✓ Simplicity of control, ease of operations eliminates operator fatigue.
- ✓ REID's modern design eliminates useless weight; distributes approximately 3½ tons *properly* to eliminate vibration and withstand heavy overloads.

Production achieved on small caliber shells.
Example: — net production 75-90 mm. shells

Rough surface ends	75/hr.	Drill pip	65/hr.
Rough turn	58/hr.	Bore base	60/hr.
Bore nose	80/hr.	Band groove	85/hr.
Recess nose	80/hr.	Bourrelet	65/hr.
Finish turn	58/hr.	Band form	90/hr.

Reid Brothers Company, Inc.

140 ELLIOTT STREET BEVERLY, MASS.

Dollinger Unit Filters Pipes With Max Pressure of 40 psi

Four pipeline filter models feature one-bolt accessibility for inspection and cleaning without removing filter from line. Designed for installations requiring only 40 psi max pressures for compressed air or gas, filters are made in two sizes with either absorption-pad media (for removal of oil and water vapor) or Dollinger radial-fin inserts (for removal of dirt and pipe scale). Filter diameter is 3½ in. and length is 6½ or 10 in.

Dollinger Corp, 11 Centre Park, Rochester 3, NY

Stair-Climber Hand Truck

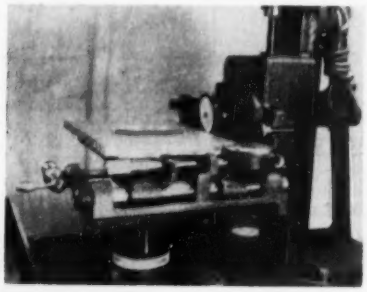
Abco E-Z Climb hand truck has two aluminum rocker shoes to support the load while moving up or down a step. After each step the arms return to neutral, being mounted on a spring-loaded, double-action axle. The device, increasing truck weight by four pounds, eliminates drag or sliding friction. The E-Z Climb, an addition to the regular Abco hand truck line costs $10 more than trucks without the rockers.

Automatic Bending Co, Harvey, Ill

High-Speed Toolbits

Plew Tool Co adds Tuf-Cut and Lucky 7, two high-speed steels, to its line. From these are made square and flat toolbits and cutoff blades, hollow mills, form-facing tools, counterbores, step reamers, facing cutters in either spiral or radial relief, and tools ground to the buyer's prints. Both steels are of high tensile strength and rate 64 to 66 R_c. Lucky 7 is a vanadium steel; Tuf-Cut a molybdenum steel.

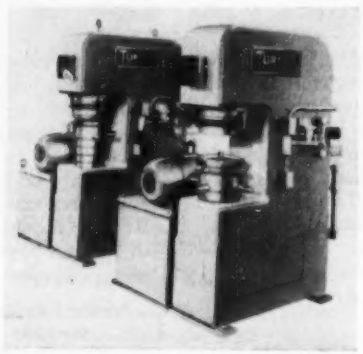
Plew Tool Co, Inc, Columbia City, Ind



Coordinate Stage for Portman Optical Comparator

Portman announces an optical stage for its Model C-100 optical comparator. Travel 1½ in. longitudinally and 1 in. transversely is possible with this unit which includes two dial indicators and two micrometer spindles. Platform area is 6x9¼ in. and includes a 4-in.-dia glass insert disk.

Portman Instrument Co, Inc, 6 Manhasset Ave, Port Washington, NY



50-Ton Hydraulic Assembly Press

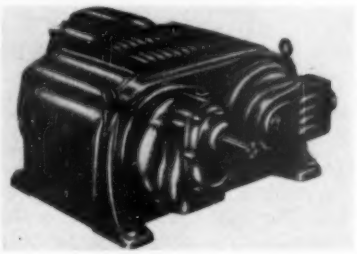
Hydraulic assembly press is designed for accurately maintaining center distances in assembling inner portions of fluid couplings. Press ram is set with an indicator, the stroke being electrically and hydraulically controlled.

Turner Bros, Inc, 2625 Hilton Rd, Ferndale, Mich

Portable Black Light Inspection Unit

Model B-50-H Mineralight is an intense 100-w long-wave (3660 AU) hand lamp which operates on 110-v ac current and throws a 30-ft beam of ultra-violet light. Matching hood and base fully enclose bulb and transformer. Black light can be used to detect oil leaks and, in combination with fluorescent dyes, for the detection of flaws, adulteration, decay, or contamination. Radiation is said to be absolutely non-injurious. Price: $79.50

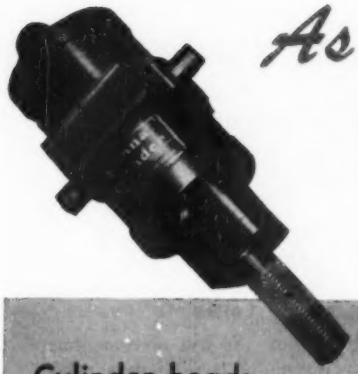
Ultra-Violet Products, Inc, 145 Pasadena Ave, South Pasadena, Calif



Horizontal Varidrive Motors With Ratings to 30 hp

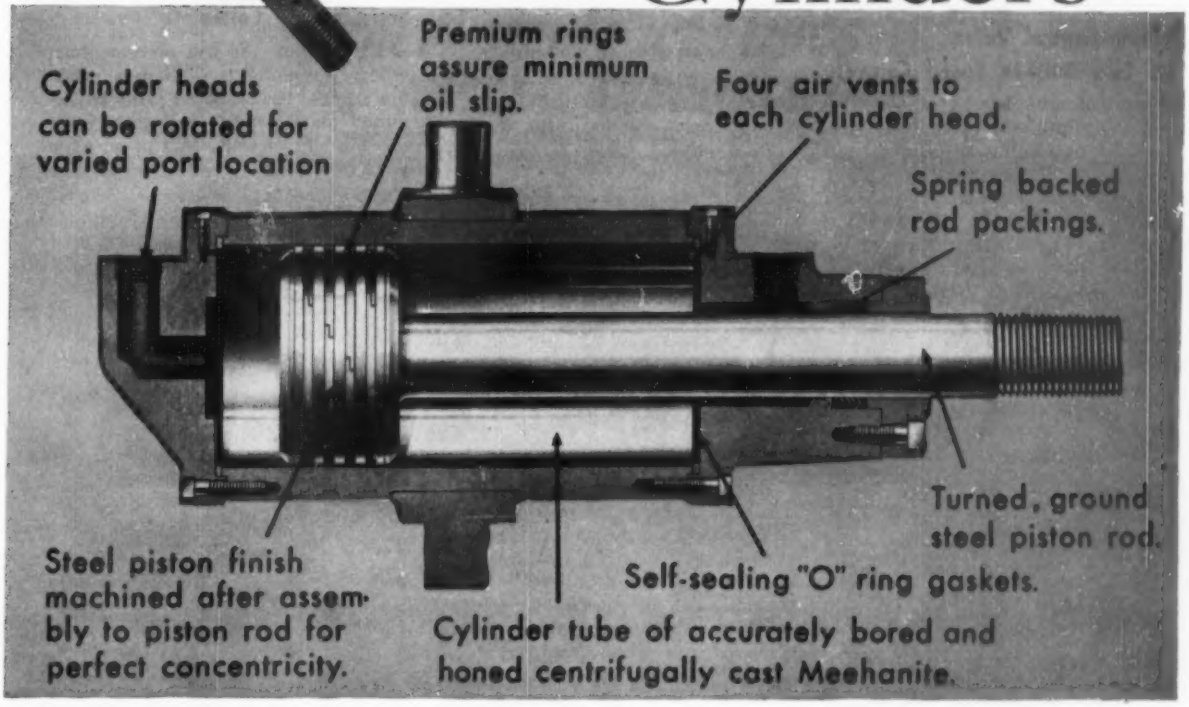
US Electrical Motors announces the addition of the 64VE to its horizontal frames. With all the features of its upright equivalent, (such as unit construction, microspeed control and indicator, asbestos-protected motor, and normalized castings), the 64VE is available in combination with the US Synchrogear with either single or double reduction gearing. Remote controls are available with mechanical extensions or electric push-button stations.

US Electrical Motors Inc, Box 2058, Terminal Annex, Los Angeles 54, Calif



As always DESIGNED AND BUILT FOR *FINEST* PERFORMANCE

Hanna H P HYDRAULIC Cylinders


Premium rings assure minimum oil slip.
Four air vents to each cylinder head.
Cylinder heads can be rotated for varied port location
Spring backed rod packings.
Turned, ground steel piston rod.
Steel piston finish machined after assembly to piston rod for perfect concentricity.
Self-sealing "O" ring gaskets.
Cylinder tube of accurately bored and honed centrifugally cast Meehanite.

for 50 years the Hanna nameplate has signified the finest engineered products. Meeting JIC Hydraulic Standards is nothing new for Hanna High Pressure Hydraulic Cylinders. They have always been designed, engineered and built to assure top-quality and dependable performance.

There is a complete line of standard Hanna H P Cylinders — for working pressures up to 1500 p.s.i. — to suit nearly every mounting requirement — to supply safe, smooth, economical power in thousands of industrial applications.

Send for **NEW CATALOG**

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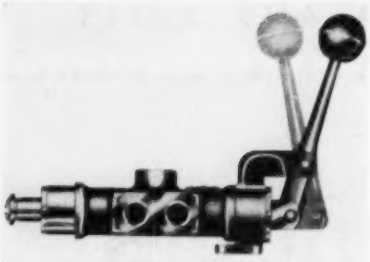
Hanna Engineering Works

HYDRAULIC AND PNEUMATIC EQUIPMENT . . . CYLINDERS . . . VALVES . . . RIVETERS

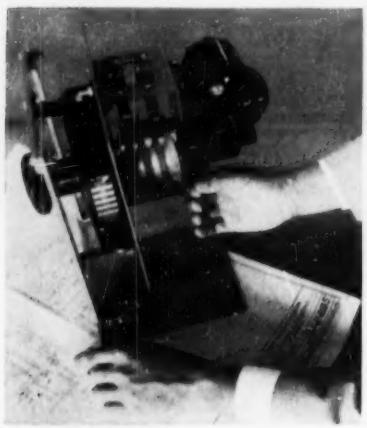
1740 Elston Avenue, Chicago 22, Illinois



Valvair Control Valve Has Two Built-In Speed Controls

Air-control valve has two speed controls built into the valve body, the principal use being to control the stroke of an air cylinder. Because it will save the expense of separate speed control units and result in simpler piping, it is claimed that installation of this valve will effect a cost saving of more than 50%. Production is currently limited to the ⅜-in. pipe size, standard four-way piped exhaust model.

Valvair Corp, Akron, Ohio



Motor-Operated Rheostat

Motor-operated field rheostat is available to adjust speed of dc motors up to 200 hp, and voltage of generators up to 300 kw.

Two snap-action limit switches, cam-operated, are supplied with each RK unit, with additional switches available for auxiliary circuits. Each cam is adjustable over a 360° range from the front of the rheostat, available for 15°, 45°, and 90° travel.

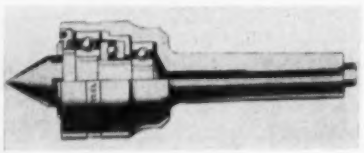
One gear ratio permits full travel in from 5 to 15 seconds; the other, in 15 to 45 seconds. Travel time can be adjusted over a 3 to 1 range by inserting resistance in the motor circuit.

Westinghouse Electric Corp, Pittsburgh 30, Pa

Overload Indicator for Distribution Transformers

Type PL indicator logs overload performance on Westinghouse conventional distribution transformers, utilizing a bimetallic thermostat embedded in the winding to indicate copper temperature. For the first five overloads, a red light remains on until the temperature falls again. After five overloads the light remains lit. In all cases a pointer will continuously remain at the overload position of the dial. A reset button makes it possible to turn the light off and reset the indicator to zero.

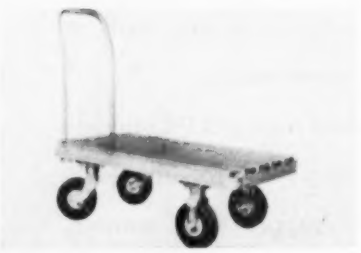
Westinghouse Electric Corp, P O Box 2099, Pittsburgh 30, Pa



Red-E Spinning Center For Use At 10,000 rpm

Designed to meet speeds and heavy thrust loads of spinning operations, center uses two radial bearings with a ball thrust bearing in the center. It is said to maintain safe handling temperature at speeds better than 10,000 rpm and under unusual loads. Shell is one-piece construction of high-alloy steel and points are of high speed steel, ground after bearing assembly. The labyrinth enclosure prevents entry of cutting chips and escape of lubricant.

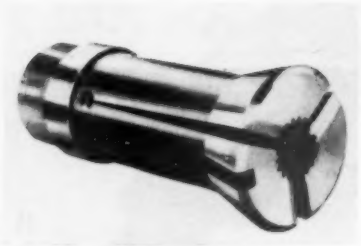
Ready Tool Co, 55½ Iranistan Ave, Bridgeport 5, Conn



Aluminum Handling Truck

Tobey aluminum trucks incorporate rounded corners and a torsion-flexible bed. Available with capacities up to 6000 lb, a typical example is the 24x48-in. truck with a capacity of 2000 lb though weighing only 57 lb.

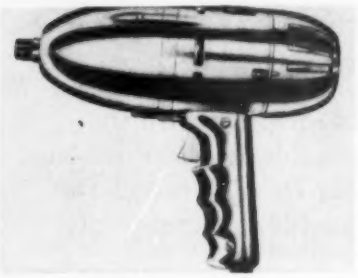
Tobey Manufacturing Corp, 1221 El Segundo Blvd, El Segundo, Calif



Self-Cleaning Collet

Sheffer collet, for use on machines where the collet is used in a rotating spindle, is designed with an inclined plane on the following edge of each slot face. Instead of an edge which collects foreign matter, the angular surfaces act as fan blades to forcibly repel it. Production tests report that the collet has been used for months, with no functional difficulty due to fouling, on the same jobs that formerly required collet cleaning every two weeks.

Sheffer Collet Co, Traverse City, Mich



Electric Impact Tool

Impact tool motor runs continuously; the instant the torque load builds to a certain point, the rotary motion is changed into 2000 sharp blows per minute. It can be used to run and remove bolts (to ⅝ in.), as a tapping and threading medium, and for drilling, reaming, screwdriving, hole sawing, wire brushing, masonry drilling, and wood boring. The tool weighs 6¾ lb and has a 115 v universal motor.

Syntron Company, Homer City, Pa

Quick-Change Soldering Element

Hexacon soldering-iron elements feature a terminal block that can be removed by depressing the steel-spring terminal guard, obviating the need of fishing the element lead wires around the terminal. A brass sheath prevents damage to resistance wire when replacing elements.

Hexacon Electric Co, 135 W Clay Ave, Roselle Park, NJ

No. 118 of a Series of Typical Installations

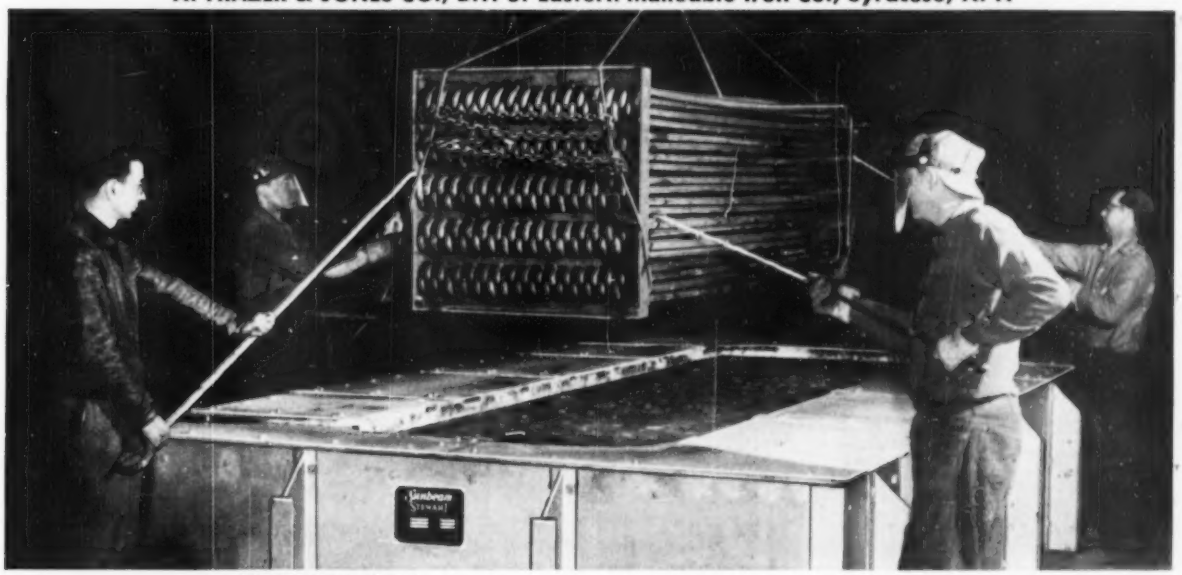
Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE

HOW SUNBEAM INDUSTRIAL FURNACES MEET THE DEMANDS ON THE PRODUCTION FRONT

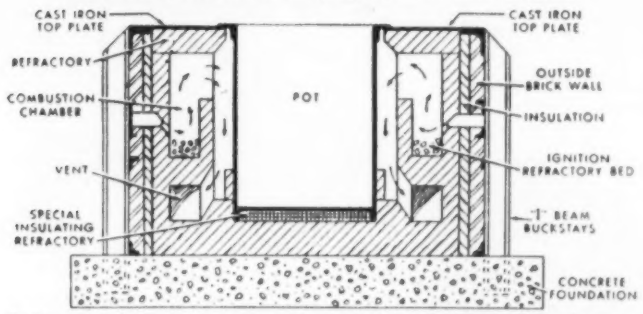
GALVANIZING CASTINGS AND MISCELLANEOUS WORK

At FRAZER & JONES CO., Div. of Eastern Malleable Iron Co., Syracuse, N. Y.



SUNBEAM STEWART

INDIRECT HIGH-SIDE FIRED (Gas) GALVANIZING SETTING



Fuel is completely burned in a separate combustion chamber. Hot products of combustion flow evenly up over a dividing baffle wall to the top section of the pot and then down the side to exhaust vents.

A variety of work is processed in the two Sunbeam Stewart Galvanizing furnaces in use at Frazer & Jones. Besides their own castings, they galvanize various products for outside companies, including special pipe-fittings, pole-line hardware, castings, naval weldments, forgings, etc. Kettles have been designed large enough so that the work can be easily handled in dipping, and can be completely dipped without disturbing the cool bottom area of the kettle where the dross collects.

Improved design and correct engineering have made Sunbeam Stewart the leader for galvanizing equipment. Quality of work and low cost of maintenance and operation are key factors in Sunbeam Stewart's design which have proved their worth year after year. Users report dross loss as low as 5% and kettle life up to six years. If galvanizing is important in your manufacturing process, it will pay to consult Sunbeam Stewart. Designs are available for small or large production. We will be glad to submit ideas on how you can get more economical operation.

IF YOU ARE CONSIDERING DEFENSE WORK CALL SUNBEAM. Designs are available for heat treating the following materiel:

SHELLS: 57MM; 75MM; 90MM; 105MM; 120MM; 155MM; 3", 5", 6", 8" Navy Shells (Harden, Quench and Draw).

FORGINGS: Rotary Hearth and Pusher-type Forging Furnaces.

ARMOR PIERCING SHOT (Harden, Quench and Draw).

CARTRIDGE CASES (Anneal, Stress Relieve).

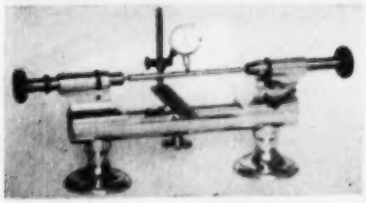
MACHINE GUN CLIPS (Harden, Quench and Draw).

JET AIRCRAFT and TANK PARTS

Sunbeam CORPORATION (Industrial Furnace Division)

Main Office: Dept. 119, 4433 W. Ogden Ave., Chicago 23—*New York Office:* 322 W. 48th St., New York 19—*Detroit Office:* 3049 E. Grand Blvd., Detroit 2
Canada Factory: 321 Weston Rd., So., Toronto 9

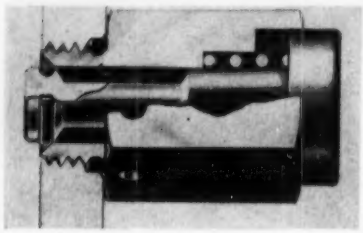
A letter, wire or 'phone call will promptly bring you information and details on SUNBEAM industrial furnaces, either units for which plans are now ready or units especially designed to meet your needs. Or, if you prefer, a SUNBEAM engineer will be glad to call and discuss your heat treating problems with you.



Portable Bench Centers

Fearless bench centers provide an accurate holding means for inspection purposes. A dial indicator shows runout. Work mounted on arbors can be checked radially for side runout or camming imperfections. Units are equipped with collet center holders so internal and external centers and other special fixtures may be used between the quill heads. Two models are available. One has a 12-in. bed and an 8-in.-maximum center distance; the other an 18-in. bed with a 14-in.-maximum center distance. Dial indicators are calibrated to 0.001, 0.0005, or 0.0001 in.

Fearless Tool Co, 7045 Darby Ave, Reseda, Calif



Spring-Loaded Air Release Valve

Manually operated valve was designed to allow rapid air escape and eliminate the hazard of not turning off a petcock type of valve. The valve is held closed by a spring when the manual pressure is released. Standard 9/16-18 threads permit normal installation with either O-ring or gasket seal. Valve length is 1 in. with a 13/16 in. hex. Delivery in 30 to 60 days.

James-Pond-Clark, 2181 E Foothill Blvd, Pasadena 8, Calif

Campbell Contour Attachments Available Nationally

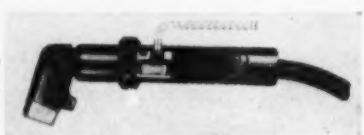
Campbell Attachments, in use in southern California, are being made available nationally by Coquipco. The units are different from the normal pattern because the pressure works against a hardened, ground templet instead of the workpiece. A four-way air valve enables reversal of the pressure when necessary. It is reported that the attachment can be set up or removed from an engine or turret lathe within an hour.

The milling contour attachments have a superimposed table mounted on the regular mill table with an actuator at each end. The stylus is mounted on a bracket secured to the knee of the machine. It is unnecessary to disconnect any of the feeds—a rough cut may be made in one longitudinal direction and a finished cut on the return by screwing in the crossfeed a few thousandths.

Contour grinding has been done by the milling and lathe attachments by securing a spindle to the slide on the lathe attachment and by using a grinding spindle in the vertical head of the mill.

The contour attachment can also be adapted to planers and vertical boring mills without change in the basic units.

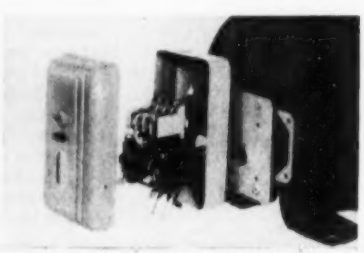
Coquipco, 236 S Coronado, Los Angeles 4, Calif



Welding Cable Connector

Combination connector provides for attaching the welding cable to the holder with or without soldering. A tight connection is effected and a large contact area made possible between the holder and the cable by a ½-in. dia fine-thread socket screw. A hole is provided in the fiber handle for the insertion of hex key wrench.

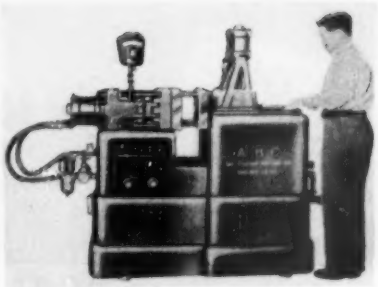
Bernard Welding Equipment Co, 1022 Ave N, Chicago 17, Ill



Furnas Starters and Contactors Mount Directly on Motor

Motor-Mount starters can be mounted directly on the motor in several positions, saving labor and conduit. Two types of simple adapters are available.

Furnas Electric Co, 1044 McKee St, Batavia, Ill



1½-lb Zinc Die Caster

ABC Die Casting Machine Co has designed a 1½-lb zinc die casting machine, air-operated, capable of a free-cycling speed in excess of 1000 shots per hour. It is said that easy setup and operation and lightning production speed make single cavity molds practical and profitable. Features include an electronically controlled panel, 10x10x2½ in. die blocks, four tie bars, and semi-automatic cycling with adjustable timing dwell on opening and closing of the toggle. The pot capacity is 275 lb of zinc, the operating air pressure from 100 to 125 psi, and the power supply 110-125 volts ac. The machine dimensions are: height 66 in., width 27 in., length 80 in. Weight is 2000 lb.

ABC Die Casting Machine Co, 339 W 112th Pl, Chicago 28, Ill

Caddy Electrode Holder

Caddy Type B electrode holders (300 and 400 amp) are designed for cool operation and high conductivity. The welding cable travels through the body and is attached to a replaceable beryllium copper jaw with a Cadweld solid copper connection which will carry more current than the cable itself. The operator's hand is over insulated cable, air space, and ribbed handle, four inches from the connection. Manufacturer claims 80% conductivity at the electrode and a weight saving of 4 to 7 oz over competitive holders.

Erico Products, Inc, Cleveland 3, Ohio

Hanson-Whitney

announces

the latest addition to its famous Hanson Processes

the new

Hydraulic Thread Milling Machine

The Most Revolutionary Improvement in Thread Milling Since the Invention of the Thread Milling Machine in 1901 by the Late B. M. W. Hanson, Founder of the Company.

new features

Hydraulic-driven cutter and work spindles insure balanced cutter speed and work feed — provide rapid traverse carriage. Variable cutter speeds up to 3,000 R. P. M. make possible instant adjustments during operating cycle. High speed permits efficient use of carbide cutters where applicable. The famous Hanson features of interchangeable lead cams, cross-feed cams, and completely semi-automatic operating cycles are retained in these machines.

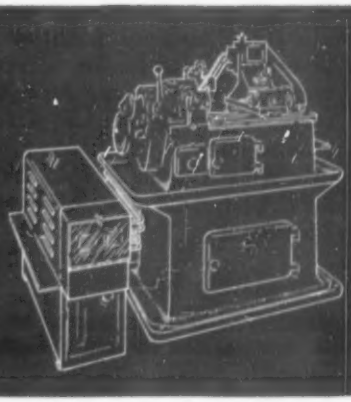
Extensive field tests prove increased production, accuracy, and improved finishes. Production costs cut in half . . . cutter life three times greater.

Manufactured in the following capacities: 4" x 9", 10" x 24", 15" x 30", and 20" x 48". Longer beds to suit customers' requirements.

Engineered, Produced and Sold by the
HANSON-WHITNEY DIVISION of the WHITNEY CHAIN CO.
169 Bartholomew Avenue, Hartford, Connecticut, U. S. A.

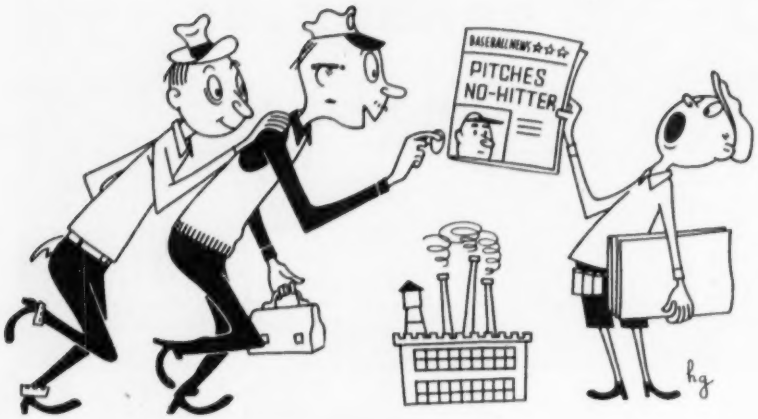
the **HANSON**
Threading Processes
Offer Complete
Coordinated
Responsibility
for
The Machine Tools
The Cutting Tools
The Measuring Gages

1HW53A



If you have a threading problem, the "Hanson Processes" will offer you the most economical solution. Investigate today.

Control gives top results in grinding too!



SIMONDS ABRASIVE CO.

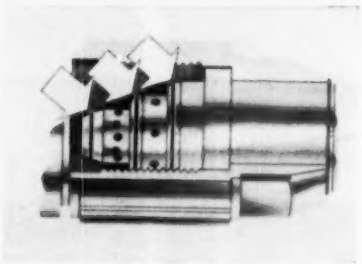
Grinding Wheels

Take Simonds Wheels, for instance! They're quality-controlled for top performance. And this is *complete* quality control. It begins with the raw materials used in the wheels. It continues throughout the screening, mixing, pressing, firing and finishing operations. It governs the minute, but essential variations in the relationship between bonds and cutting particles. It is backed by research and maintained by modern facilities to give you consistently superior results on roughing, finishing, cutting-off, polishing and sharpening. Free data book gives details on complete line. Write for it, and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.



Welding Torch Mixer Has "Gas-Tite" Seating Rings

Welding torch mixer with Servene seating rings permits the mixer to be attached to the torch handle without using a wrench. The mixer fits the manufacturer's Torchweld handle, as does the new model of the flame-cutting attachment which is also fitted with seating rings. This will be advantageous to those whose work requires frequent changes from welding to cutting using the same handle.

National Cylinder Gas Company, 840 N Michigan Ave, Chicago 11, Ill

Copper-Clad Hardenable Steel Developed for Spring Parts

High conductive spring material, called Conflex copper-clad hardenable steel, is a composite metal consisting of a layer of medium-carbon steel with a thin layer of electrolytic copper clad to one or both sides. Primary advantage is said to be its low cost, compared with hardenable copper alloy metals.

Product is manufactured with copper in various thickness ratios—10/80/10 and 80/20 are adequate for the majority of applications. Widths up to 8 in. and thicknesses from 0.050 in. down are readily available.

The metal is supplied in a soft condition for fabrication. Spring characteristics are obtained by heat-treating the parts.

Metals & Controls Corp, General Plate Div, Attleboro, Mass

Low-Cost Comparison Specimens Determine Surface Roughness

Line of roughness comparison specimens, known as Surface Sticks, consists of various surface specimens individually finished to definite micro-inch readings, and grouped together in finish-comparison bars.

Operator holds the bar opposite the work to make a fast, accurate visual comparison check of roughness, waviness, and lay. Finishes can be instantly compared and checked

for conformation to specifications at the machine.

Available in 1x1-in. round plug form, and in 1x1½x1-in rectangular blocks, in boxes of 3, 5, or 8 assorted surface finishes.

Acme Industrial Co, 200 N Laflin St, Chicago, Ill

Ace Diamond Wheels and Hones

Line of Star Dust diamond wheels and hones is available from Ace Laboratores.

Specially developed bonding method is said to give wheels maximum efficiency. Bond is hard enough to hold abrasive properly, yet dissipates at a rate calculated to keep abrasive surface always even.

Available in all types and sizes, the wheels and hones are said to be economical, durable, free cutting, and have a minimum of loading.

Ace Abrasive Laboratories, 250 W 57th St, New York, NY

Plating Processes Require No Nickel

Two decorative plating processes have been developed for use on parts commonly having a copper-nickel-chrome finish. They are designated as Probrite CR-723, a buffing grade deposit, for parts that can be color buffed after plating.

Both finishes can be deposited over steel or copper, and can be readily chrome plated. Promat sealer for use over chrome plating prolongs life of the finish.

Brilliance of finishes is reported comparable to copper-nickel-chrome. Protection of steel against red rust is claimed to be as high as 200 hours in a standard salt spray test, approximately twice the test life of copper-nickel-chrome.

Poor & Co, Promat Div, 851 S Market St, Waukegan, Ill

Integral-Shaft Type Sheave Unit

Rigidly-constructed, D-Section, integral - shaft - type motion - control Vari-Pitch sheave unit intended for paper machine back-lineshaft drives is suitable for application wherever an outboard bearing is employed. The sheave discs of this unit are assembled directly on a finished shaft. Larger diameter shaft extensions (to 4¾ in.) are possible. The Vari-Pitch sheave can be remotely controlled by pilot motor or manually controlled by mechanical means.

Allis-Chalmers Manufacturing Co, Milwaukee 1, Wisc

CAPEWELL MAKES EVERY TOOTH COUNT

IT'S THE TEETH THAT COUNT!

CAPEWELL MAKES EVERY TOOTH CUT . . . ASK YOUR DISTRIBUTOR

1881 CAPEWELL

Power HACKSAW BLADES

MAIL THIS COUPON NOW

THE CAPEWELL MANUFACTURING CO.
65 GOVERNOR STREET
HARTFORD 2, CONN.

Please send me your bulletin on Power Hack Saw Blades.

Name _____

Company _____

Address _____

City _____ State _____

Go Beyond the Call of the Job...
with Zagar SPECIAL DRILLING MACHINES!
EQUIPPED WITH ZAGAR'S HYDRAULIC FEEDER UNITS
Drills and taps 16 holes in truck transmission case.
Drills three holes in foot-step bearing for weaving machine.
★ ★ ★
Drills 28 holes in hydraulic piston and sleeve of hydraulic steering unit.
Drills 27 holes in gas oven burner.
Zagar
Zagar

Zagar presents a new outlook on machines built for single, long production runs. A machine equipped with Zagar Gearless Drillheads and Hydraulic Feeder Units has use long after completing the job it was built for. Each gearless drillhead and each feeder unit on Zagar "Specials" is complete in itself. Any one or all of them can be removed and remounted in any sequence to produce on other production jobs. Standard Zagar Drillheads are adaptable to standard drill presses or special machines of your own make. Write us for detailed information on the basic equipment used in Zagar Special Drilling Machines.

Write for Engineering Manual "A-4" for more information on all Zagar's tools for industry.

ZAGAR TOOL, INC.

24000 LAKELAND BLVD. • CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

Three new higher-wattage rheostats are in production which enlarge the range of the recently improved H-50 model. The H-75, H-100, and H-150 units are so named to indicate wattages.

Hardwick, Hindle, Inc, Newark, NJ

Scout model Acousti-Booth for telephoning in noisy locations shields user's head and shoulders, and has double the density of sound absorbing materials previously used to line inside of the booth.

Architectural Products Div, Burgess-Manning Co, 5970 Northwest Highway, Chicago, Ill

Dow Corning 997, a silicone dipping and impregnating varnish for Class H insulation, is claimed to cure as rapidly as typical Class B varnishes, and yet has over 100 times their dielectric life at 200 C. Elimination of graduated curing schedules reduces total processing time to less than a quarter of that formerly required for Class H equipment.

Dow Corning Corp, Midland, Mich

All-State No. 430 silver-bearing stainless steel solder contains neither lead, zinc, nor cadmium. Applicable with a soldering iron or torch at 430 F, it is said to bring high strength to the soft solder class, thus reducing need for costlier materials and brazing methods. Can be chrome plated.

All-State Welding Alloys Co, Inc, White Plains, NY

A 10-ft spring-recoil model has been added to the Atlas line of steel welder's rules. Cumulative inch and feet indication eliminate conversions and computations. Tape is extra wide, held extended at any point by an automatic brake. Price, $3.25.

Atlas Welding Accessories Co, 707 E Lewiston St, Ferndale, Mich

Small-parts cabinets with variable drawer compartments have been designed for use on benches, counters, and shelves. Slots on 1-in. centers in drawers permit quick rearrangement for accommodating various parts quantities.

Bay Products, Inc, 3009 N Sixteenth St, Philadelphia, Pa

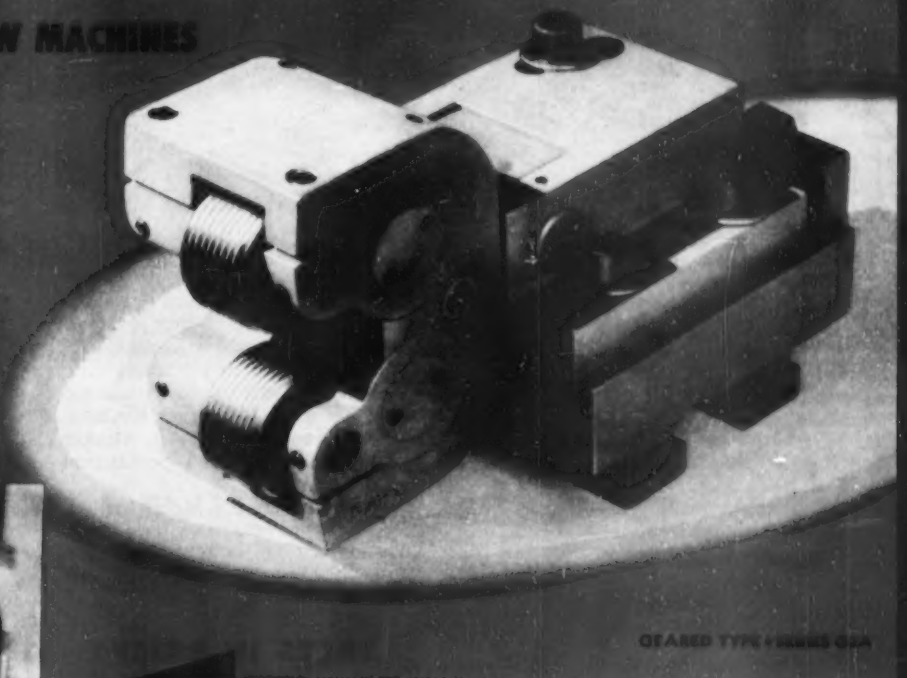
Line of 2¼-in. heavy-duty roller conveyors for use where capacity up to 600 lbs per roller is required is available in widths from 6 to 36 in., in 5- and 10-ft and 90° curves.

Thread Rolling Attachment

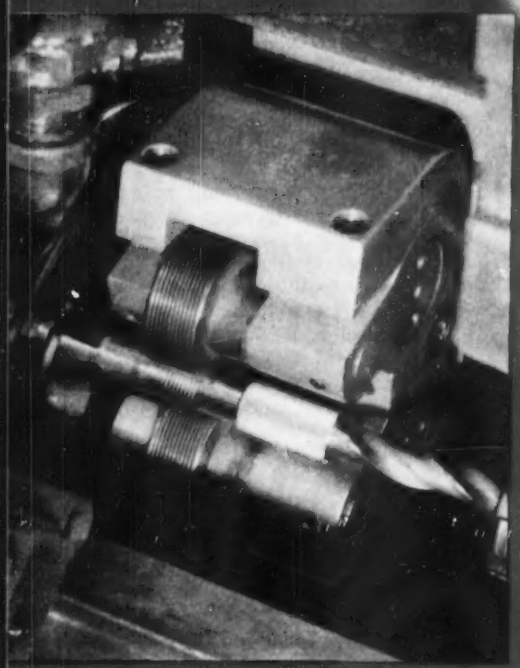
FOR AUTOMATIC SCREW MACHINES AND TURRET LATHES

Full diameter range to maximum capacity

Simple precision matching



GEARED TYPE • SERIES GSA



Thread rolling is accepted as an economical and preferred method of producing smooth precision threads on automatic screw machines at high producing rates. It permits threading close to shoulders, and since rolling can be done on the collet end of the part behind shoulders, a secondary threading operation is often eliminated.

The Reed Thread Rolling attachment is a multi-purpose tool with two opposed rolls which pass over the work when rolling the threads. It is built in several sizes and each size has a diameter from zero to a maximum capacity. The Reed Attachment is easy to set up. Simple precision matching unit provides for accurate matching of the thread rolls. No change in spindle speeds is necessary and only a few revolutions of the work are required to roll the thread.

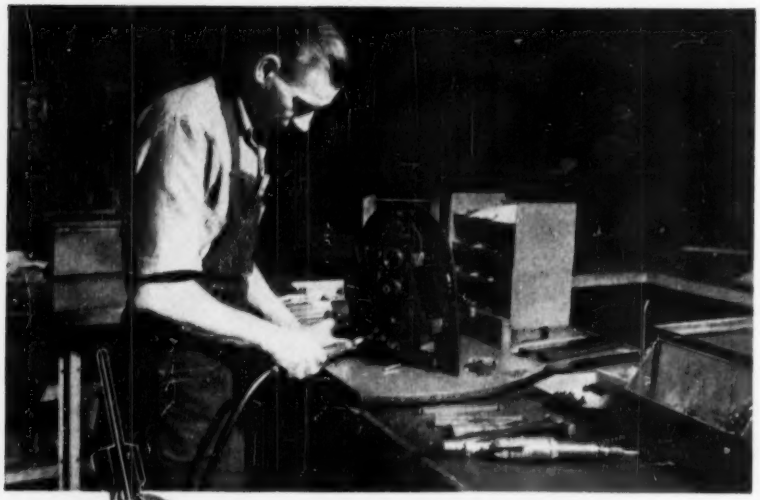
Write for Thread Rolling Attachment Bulletin 1-21

REED ROLLED THREAD DIE CO., Worcester, Mass., U. S. A.

Sales Offices in: BUFFALO • CHICAGO • CLEVELAND • COMPTON, CALIF. • DETROIT • ENGLEWOOD, N. J. • HOUSTON
INDIANAPOLIS • MILWAUKEE • MONTREAL • NEW YORK CITY • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SYRACUSE • TORONTO

KELLER Air Tools

Increase Production per Man-Hour



ANOTHER EXAMPLE OF

KELLER *Air Tools engineered to industry*

Keller Screw Drivers and Nut Setters brought important benefits to a manufacturer of duplicating machines. He says: "Since we started using Keller air tools there has been a noticeable reduction in worker fatigue, and increased production per man-hour.

"Our work requires highly skilled, intelligent workers, and these tools have given them better satisfaction in their jobs, and improved our labor relations."

Weigh less

Consume less air

Reduce operator fatigue

Wide variety of handles, gearings, torques, speeds

Interchangeable parts

Need fewer "back-up" parts in the tool room

Clutches, socket drivers, 45° and 90° attachments for every purpose

FACTS IN BRIEF

ABOUT KELLER PNEUMATIC SCREW DRIVERS

Send for

FREE 36-Page Booklet

for more information and interesting ideas on air tool application

Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet on Pneumatic Screw Driving and Nut Setting Tools

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Rollers are 2¼ in. dia, 3/16-in. wall thickness. May be equipped with standard bearings, grease-packed, or dust-sealed bearings.

Sage Equipment Co, 31 Essex St, Buffalo, NY

Slip on guard, called the Gets-A-Lite-Guard & Guide, is a device designed to prevent fluorescent lamps from falling from their sockets, despite heavy vibration or spreading of fixtures. Installed without tools, guard slips over the sockets at each end of the fixture; lamps can be changed without removing guards.

Gets-A-Lite Co, 3865 N Milwaukee Ave, Chicago, Ill

Non-crystallizing tall oil, called Flextal has been developed as a replacement for rosin-fatty acid mixtures used in production of varnish. Esters made from the product are claimed to be fast-drying, fast-bodying, light in color with good retention and elasticity. In soluble cutting oil applications it is expected to replace rosin and oleic acid mixtures. It requires no melting or blending, and mixes with all petroleum bases.

Farac Oil & Chemical Co, 145th St & Indiana Ave, Chicago, Ill

Miniature thermoswitch, available in rectangular and cylindrical models has been designed for precise temperature control and overheat detection in instruments and mechanisms where minimum volume and weight are important. Temperature control to within 1 F is readily attainable; either model may be set at any point in the range from 0 to 200 F by turning adjusting screw. Accurate control is maintained under vibration conditions of 5G at 50 to 500 cycles per second. Both models are rated at 2.5 amps at 115 v ac or 2 amps at 28 v dc.

Fenwal Inc, Ashland, Mass

MR hydraulic coupling and adapter union, equipped with standard O-ring seal, is said to be absolutely leakproof at pressures up to 5000 psi, when drawn up hand tight, even with hose as large as 1-in. and 1¼-in. ID. Rings can be easily replaced when worn.

Eastman Manufacturing Co, Manitowoc, Wis

Silicone Varnish 994, an electrical insulating resin, has been developed for coating glass cloth and sleeving,

and for bonding mica-glass combinations. Craze life is in the range of 3000 hr at 250 C, and 800 hr at 300 C, or more than three times the dielectric life of varnishes now in commercial use.

Dow Corning Corp, Midland, Mich

Kwikflux No. 94 for high temperature brazing and hard soldering of ferrous and non-ferrous metals is said, because of its greater film strength, to eliminate island formation, prevent oxidation and scale, and to protect and clean metal surfaces. Can be used with all standard silver, brass, bronze, and other hard solders, and direct, indirect, and induction heating.

Special Chemicals Corp, 30 Irving Place, New York, NY

Vernier slide calipers, made by Schweitzer (Germany) are available in this country in sizes from 10 to 96 in. Tool is hardened chrome steel, with accurate machine-divided graduation providing precision readings or settings in English measure to 1/1000th in. Wooden case is provided.

Glogau & Co, Inc, 1914 Birchwood Ave, Chicago, Ill

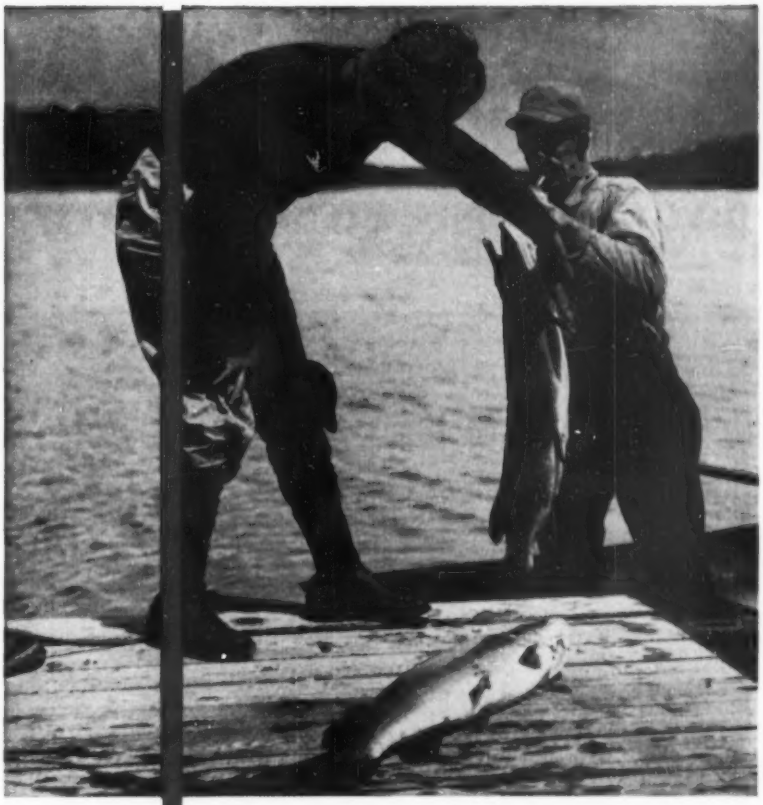
Steel date stamps are available to indelibly mark tools, assemblies, any product or material, with date of manufacture. Sets consist of 12 individual stamps, each with a key letter which changes annually, and a number to indicate the month. Available in 1/16-, ⅛-, and 3/16-in. character sizes, or reproduced to specifications.

The Parker Stamp Works, Inc, 650 Franklin Ave, Hartford, Conn

Automatic centerless buffs are now equipped with a rigid steel ring which grips cloth securely in its channel. Pre-assembly of buff is accomplished with use of two tubes, each welded to the inside of the flange; one tube is fitted telescopically into the other, and setup of buffs is tightly secured between the two flanges.

American Buff Co, 2414 S LaSalle St, Chicago, Ill

Plastic-dipped cotton gloves can be reconditioned and reprocessed through Glovco National Service designated Over-Kote. Service includes cleaning, patching and repairing, reshaping, recoating, vulcanizing, and



VINCO is on the job! No worries spoil his fishing!

The .6% average rejection rate on the dollar volume of business over the last five-year period is proof of Vinco dependability.

And this dependability is the reason why our friend's fishing trip is not spoiled by business worries. Aircraft gears and assemblies, radar component parts, gear pumps, and a wide variety of mass produced parts are supplied to many industries from coast to coast.

These industries are also using the technical knowledge of Vinco field engineers when in need of an efficient, practical spline gaging program.

VINCO CORPORATION
9125 Schaefer Hwy.
Detroit 28, Mich.

B-1 Formed Wheel Dressers
•
Gears
•
Spline Gages
•
Gear Pumps
•
Production Parts

The Trademark of Dependability

VINCO

MILLIONTHS OF AN INCH FOR SALE

26-year record proves DUMORE® GRINDERS give low-cost, accurate service

Mounted on a Universal Grinder, the Dumore operates at a spindle speed of 40,000 rpm. Work speed is 300 rpm.

How DUMORE insures high-speed internal grinding . . . mirror finish at low cost

PRODUCING drill chucks requires a difficult jaw grinding operation. Smooth finish and correct back taper are necessary. And each day, the grinder must withstand millions of hammer-like blows transmitted to the grinding wheel and spindle bearings.

Since 1927, this chuck manufacturer has used DUMORE precision grinders. Here is his report:

"Our Dumore No. 5 units operate 100 hrs. weekly to internal grind open jaws for our ⅛" to 1" plain bearing key type chucks. Material is 60 Rockwell C hardness alloy steel. We remove .005".

"The Dumores are well adapted to this fine work and produce a glass-like finish. Their sturdy power transmission, solid spindle shaft, self-oiling features, air-cooled motor and variable speeds make them exceptionally well suited for this work. They deliver continuous operation with little effort and very low maintenance cost."

If you're seeking to improve internal grinding operations, investigate the advantages Dumore grinders provide. Get details from your industrial distributor or write direct:

THE DUMORE COMPANY
1337 Seventeenth Street • Racine, Wisconsin

pairing, and is said to assure in most cases 100% reusability at a small fraction of the cost of new gloves.

US Industrial Glove Corp, 9350 Roselawn, Detroit, Mich

Anti-fog and lens cleaning cloth has been developed for use on glass or plastic surfaces to prevent formation of fog or steam caused by body heat, humidity, or temperature changes. No-Mist cloth cleans and fog-proofs in one operation, eliminating need of liquids, tissues, or cabinets.

Carol Chemical Products Corp, 368 E 45th St, Brooklyn, NY

Vinsynite FS-3 is a stable-type treatment formulated for roller coating on ferrous metals. When baked, it provides excellent adhesion qualities and resistance to all types of exposure. Intended for use under topcoats, but will itself protect surfaces for short periods of time. Chemically pretreats the metal and covers it with a primer film in one operation.

Thompson & Co, 1085 Allegheny Ave, Oakmont, Pa

New tube and reducer is available which can be used to convert any Ferulok fitting into a combination size unit, permitting connection of a smaller size tube. Product is available for all commonly used reductions within the Ferulok size range of ¼- through 1-in. OD tubing.

The Parker Appliance Co, Cleveland, Ohio

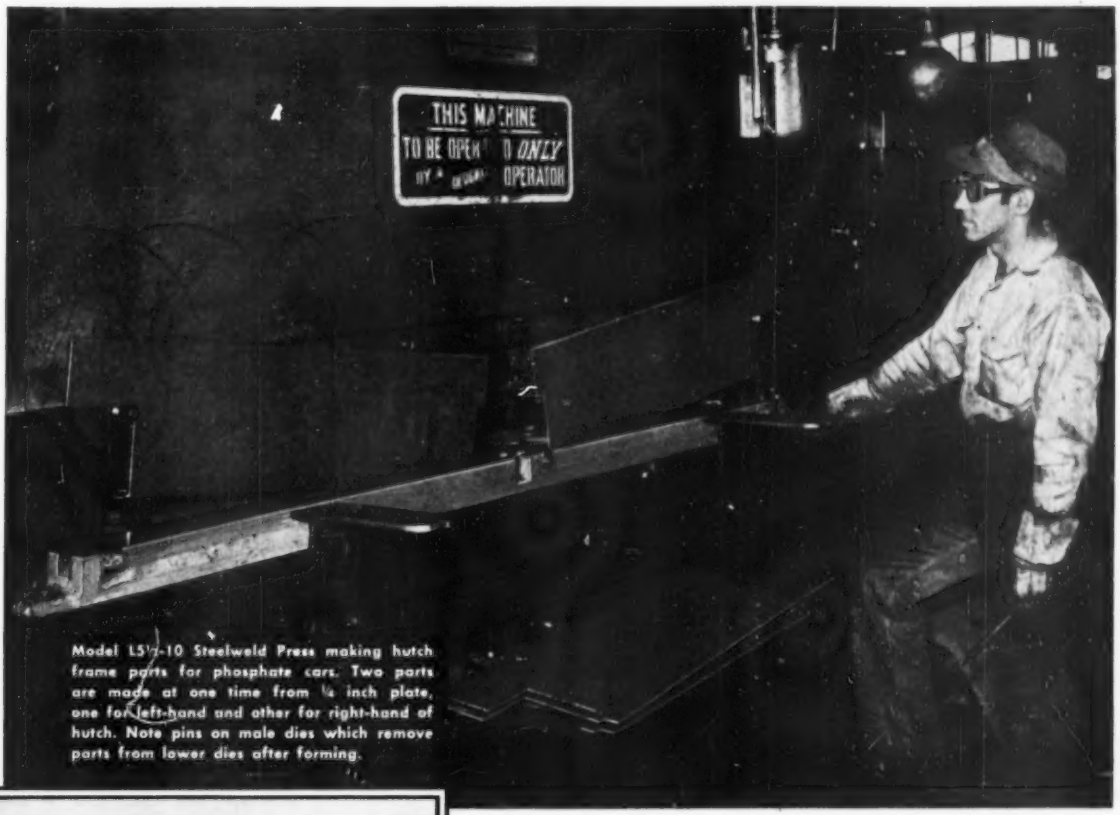
Rustrem anti-rust paints are available in three new colors: red, gray, and green, in addition to the standard black, aluminum, and clear. Can be applied over rust on all metals without wire bushing, scraping or sandblasting. Resistant to moisture, temperature changes, chemicals, acids, and fumes, and can be applied over damp surfaces.

Speco, Inc, 7308 Associate Ave, Cleveland, Ohio

Bay shelf trucks for stock or tools are 36½ in. high, including casters. Steel shelves have a 2-in. flange; bottom shelf is fixed with flange turned up, others are reversible. Furnished with two 5-in. rigid casters and two 5-in. swivel casters, either rubber or steel.

Bay Products Inc, 3001 N 16th St, Philadelphia, Pa

PULLMAN-STANDARD FINDS MANY USES FOR STEELWELD PRESS



Model L5½-10 Steelweld Press making hutch frame parts for phosphate cars. Two parts are made at one time from ¼ inch plate, one for left-hand and other for right-hand of hutch. Note pins on male dies which remove parts from lower dies after forming.

A few of the many parts produced within a short period on the Steelweld Press. Curves and bends of every shape and degree are formed quickly and accurately.

"The more we use our Steelweld Bending Press, the more we learn about what it can do for us", said the Day Superintendent of Pullman-Standard Car Mfg. Co., Butler, Penna. "As a result it is handling more and more of our work. We are doing a great many forming jobs on it that did not occur to us as being possible when we first installed the machine."

An endless variety of parts are produced on this press. These are mostly of ¼ and ⅜ inch steel plate and involve curves and bends of every description for gussets, fulcrums, braces, frames, housings, etc. used in the manufacture of railroad cars.

The dies used are relatively simple and made in the company's shop. Because dies are easily changed, it usually takes about an hour to set up for a new job.

If you work with metal plate in any thickness up to one inch, for bending, forming or punching, you should get the facts on the many features of Steelweld Presses.

THE CLEVELAND CRANE & ENGINEERING CO.
1430 EAST 281ST STREET, WICKLIFFE, OHIO

GET THIS BOOK!
CATALOG No. 2010 gives construction and engineering details. Profusely illustrated.

STEELWELD
BENDING PRESSES
BRAKING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING

DELTA MILWAUKEE

QUALITY MAKES THE DIFFERENCE

NOW! 3 Models of

DELTA Drill Units

AIR POWERED–HYDRAULIC CONTROL

A practical, low-cost way to solve machining problems involving drilling, tapping, reaming, spot facing, hollow milling, chamfering, centering, counter-sinking and the like—Use the Delta Drill Unit to devise special tool set-ups that multiply production, break bottle-necks.

Rarely has a new machine achieved success so completely and so quickly as this new Delta air-powered hydraulically controlled Drill Unit.

Thousands of manufacturers, on the alert for ways to get better production faster and at least cost, have won astonishing benefits by means of this adaptable unit—by designing special machines for multiple and series operations.

You'll appreciate "Why" when you check these 12 reasons:

1. Quick set-up. No cams used.
2. Rapid approach and return.
3. Length of approach and total stroke positively controlled.
4. Approach repeats to within .010 inch—final depth to within .0005 inch.
5. Power feed hydraulically controlled . . . independent of motor and spindle speed.
6. Compressed air provides the force on a sealed, pumpless hydraulic system to move spindle forward, completely eliminating lost motion and back lash.
7. Sealed unit construction permits operation in any position.
8. Built-in control switches.
9. Units offered as direct drive, gear drive, or pulley drive.
10. Standard NEMA frame motors.
11. Utter simplicity of operating principle and rugged design insure long, trouble-free service.
12. Operates efficiently at standard plant 80 p.s.i. air pressures.

Three models are now available to meet your specific requirements:

MODEL 19-150—1½" stroke. Capacity from No. 80 to 3/16" drill. 4 types of drives.

MODEL 19-400—4" stroke. Approximate capacity up to 5/8" drill. 5 types of drives.

MODEL 19-600—6" stroke. Approximate capacity 1" drill. 6 types of drives.

See your authorized Delta drill unit dealer —write for the new catalog.

Eight station, semi-automatic drilling machine built for Badger Meter Mfg. Co. of Milwaukee. This machine drills, counter-sinks and counter-bores over 230 parts per hour. Machine has six working stations, a total of 22 spindles producing 5,000 individual operations per hour.

Another Product

DELTA POWER TOOL DIVISION

ROCKWELL

MANUFACTURING COMPANY

618D N. Lexington Ave., Pittsburgh 8, Pa.

☐ Please send me catalog AD-723.

☐ Send name of nearest authorized Delta drill unit dealer.

Name _____

Position _____

Company _____

Address _____

City _____ Zone ___ State _____

Mechanical seal, known as the John Crane Type 19, is designed for small pumps, hot water circulators, and other rotary shaft applications. Flexible Teflon beveled cones adapt units for services involving water, oil, corrosives, or acids; temperatures from –100 to + 450 F; vacuums and pressures to 200 psi; and high shaft speeds. Available in sizes to fit shaft diameters of ¼, ⅜, ½, ⅝ and ¾ in.

Crane Packing Co, 1800 Cuyler Ave, Chicago, Ill

Inexpensive lapping plate, called Savhone, used in conjunction with a special powder, permits a lapped surface to be easily applied after grinding operations to most metals with a few strokes across the plate surface. Applicable also to emery and oil stones, and hones.

Knuth Engineering Co, 2617 N St Louis, Chicago, Ill

Excess flow or flow limiter valve is available which can also be used as an automatic drain or dump valve. Unit is designed to allow flow in one direction up to a predetermined rate, shuts off quickly and tightly to prevent higher flows, while permitting unrestricted flow in the opposite direction. Made to customer order, normally available in 60 days or less.

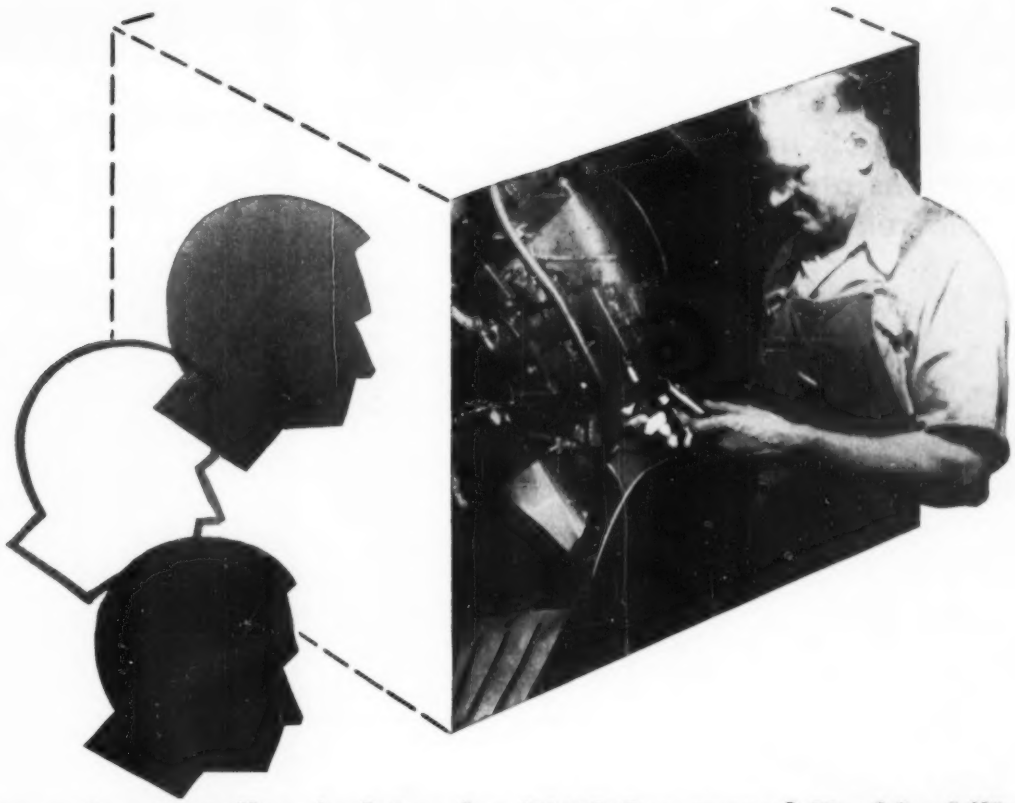
James-Pond-Clark, 2181 E Foothill Blvd, Pasadena, Calif

Electronic tool for automatic machinery has been developed, known as fused quartz ultrasonic delay lines. Electrical energy is converted into sound energy, passed through the fused quartz, and reconverted into electrical energy by transducers. Delay or transit time can be held to close tolerance. Frequency range is from 5-100 mc, with delay time values from 5 to 1500 microseconds. Stability is ± 2% between –35 and + 85 C.

Bliley Electric Co, Union Station Bldg, Erie, Pa

G-S Eye Sweep is a magnetic attraction instrument for removing foreign materials from the eye. One end is fitted with a magnet for removing steel splinters; the other is equipped with a flexible loop for cinders, dust, and other particles. Priced at $2.50 complete with hard rubber carrying case.

General Scientific Equipment Co, 2700 W Huntingdon St, Philadelphia, Pa



3-Dimension Metallurgical Service PLUS Pre-tested Machinability...

MAKE LIFE EASIER *for* AUTOMATICS OPERATORS ...who use Republic Union Cold Drawn Steels

Making sure that each lot of Union Cold Drawn Steel is right *before* it is shipped is only half of our responsibility...*after* you have received it, the Republic Field Metallurgist wants to make sure that the steel is running right, processing right. He can help you with tooling suggestions and surface-treatment recommendations.

He is one member of the Republic 3-Dimension Metallurgical Team...backed-up at home by a Republic Mill Metallurgist and a Republic Laboratory Metallurgist.

That's why you can always be sure that on your job Republic Union Cold Drawn Steels will give you *top machinability*... long tool life, high production rates at low per-cent cost, and uniform results.

Find out more about Union Drawn *pre-tested machinability*... use Republic 3-Dimension Metallurgical Service... a call to your Republic Sales Office will start things. Or write to:

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

LAB FIELD MILL
3-DIMENSION Metallurgical Service

...combines the extensive experience and co-ordinated abilities of Republic's *Field, Mill* and *Laboratory* Metallurgists with the knowledge and skills of your own engineers. It has helped guide manufacturers in countless industries to the correct steel and its most efficient usage, IT CAN DO THE SAME FOR YOU.

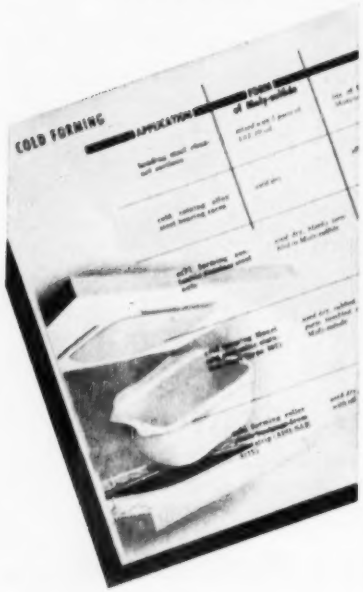
Republic UNION COLD DRAWN STEELS

REPUBLIC STEEL

Free-Machining Bessemer, Alloy and Enduro Stainless Steels • • Union Cold Drawn Special Sections
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting)

Moly-sulfide
A LITTLE DOES A LOT

shows up best where the frictional conditions are difficult



The case-histories of 154 difficult friction problems in the shop and in the field, all successfully solved, are described in a new 40 page booklet.

It is where conditions are extreme that ***Moly-sulfide*** excels over other lubricants. If you encounter extreme conditions of pressure, temperature or velocity, send for this free booklet.

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MOLY

MS-9A

Power-driven, pusher-type slat conveyor is designed to handle hot billets and heavy, bulky products. Material is pushed by bars, clamped to side-rail chains over a stationary, full-width roller bed. Available in a wide range of widths and frame pitches.

Sage Equipment Co, 31 Essex St, Buffalo, NY

Silicote skin protective ointment repels water and moisture, yet allows normal skin respiration. It may be used either before exposure to prevent irritation, or later to facilitate healing. Available in 1-oz tubes and 1-lb jars.

Arnar-Stone Laboratories, Inc, 1316 Sherman Ave, Evanston, Ill

Truarc Grip Ring, Series 5555, provides a positive shoulder secure against thrust and vibration. Can be assembled and disassembled in either direction on a straight, ungrooved shaft with pliers; takes up end-play by installing it tightly against the machine part. Sample rings for shaft diameters of ⅛, 3/16, ¼, 5/16 and ⅜ in. available upon request.

Truarc Catalog Service, Waldes Kohinoor, Inc, 47-16 Austel Place, Long Island City, NY

Dispenser for handling and assembly of Truarc E-retaining rings, Series 5133, consists of a machined, weighted base which can be mounted on a bench or assembly table. Ring-stacked rods fit into base; rings can be extracted, one at a time, with a Truarc applicator.

Truarc Catalog Service, Waldes Kohinoor, Inc, 47-16 Austel Place, Long Island City, NY

Multiple hole-punching process for stamping has been developed by which holes of varying diameters can be punched, simultaneously, from any stampable material. Present blank size dimensions range from 2¾ to 4¾ in.; thicknesses from 0.015 to 0.093; hole sizes from 1/16 to ½ in.

Federal Tool & Manufacturing Co, 3640 Alabama Ave, St Louis Park, Minneapolis, Minn

Saf-I-Weld light-weight welding helmet, made of fiber glass, is said to have greater strength-weight ratio than any other material now being used. Patented position hinge

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Dept. AM, • 1101 West Monroe Street
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locks helmet in raised or working position, adjustable to fit any head-size. One-piece seamless shell is warp-resistant to heat and moisture.

United States Safety Service Co, 1215 McGee St, Kansas City, Mo

Skid-type materials handling unit, Model GC-50 Phil-Tier is available for stacking and transporting pipe, angle iron, structural steel, and other long items. Can be self-stacked, or used with three other materials handling units in the Phillips line. Capacity is 4000 lb; tiering capacity, 16,000 lb. Overall height is 30 in., but deck width and length is produced according to customer requirements.

Phillips Mine & Mill Supply Co, 2300 Jane St, Pittsburgh, Pa

MIJ service tables have been especially designed for handling small parts beside drillpresses, automatics, or other machines. Available in eight models, with two or three shelves; each shelf has a 250-lb capacity; back and side stops on all shelves, with drop fronts for easy sliding of pans. Furnished with or without casters; units are 23 or 30 in. high.

Pucel Enterprises, Inc, 3746 Kelley Ave, Cleveland, Ohio

Line of ground thread taps with pitch diameters larger than the regular commercial-ground series is available. Taps are made to the new commercial-ground high-limit specifications in styles and sizes covered by list No. 103, 104, and 106, catalog 17. Available from stock at standard prices.

Pratt & Whitney, Div Niles-Bement-Pond Co, West Hartford, Conn

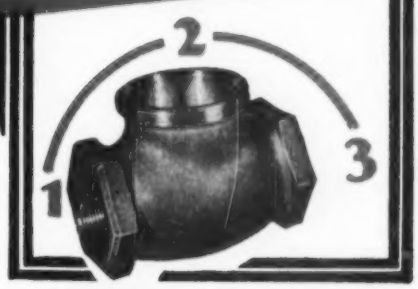
Labelon plastic pressure-sensitive labeling tape sticks without moistening to any smooth, dry surface. Can be written on with any sharp-pointed instrument, and is unaffected by temperature changes between –40 and +150 F. Available in different color combinations for coding, and in a variety of lengths and widths.

Labelon Tape Co, Inc, 450 Atlantic Ave, Rochester 9, NY

Eutec TinWeld is a solder-paste-flux combination which can be painted or brushed on, covering surface to be bonded with a thin film. Any method of heating may be applied. All common metals, except aluminum and magnesium, can be joined with full solder-bond strength.

Eutectic Welding Alloys Corp, 172nd St & Northern Blvd, Flushing, NY

ALL ENDS OF PARTS
Completely Finished
"1·2·3"
ON THE
GOSS *and* DeLEEUW
Automatic Chucking Machine
in 1 SET-UP

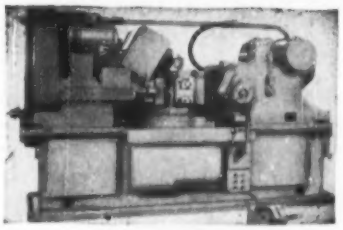


This recent Goss & DeLeeuw development has already received universal acclaim as an outstanding development.

In speed, ease of tooling and precision finishing, the "1-2-3" chucker provides engineering advantages which result in vastly greater production at a fraction of parts' costs by other methods.

Easy, fast change-over from job to job makes this machine ideal for short-run requirements. Sturdy construction, power and speed make its advantages apparent on long runs.

"1-2-3" means ability to handle work requiring machining operations on one, two or three ends simultaneously or in sequence — a method exclusive with Goss & DeLeeuw and offered on this machine.



Illustrated literature available promptly on request. Send samples of your work for time and cost estimates.

GOSS & DELEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

Farquhar Hydraulic Press at the Weirton Steel Company straightens stopper rods. It has doubled production, required practically no maintenance.

Farquhar Hydraulic Press

at the Weirton Steel Co.

"eliminates breakage of rods...increases production 100%"

The Weirton Steel Co., Weirton, W. Va., formerly straightened stopper rods with a steam hammer. The operation was slow and resulted in a high percentage of breakage. Seeking a better method, Weirton officials bought a Farquhar Press to speed production. Not only has the press increased production 100%, but it has eliminated breakage of rods. In addition, Weirton reports that in the six years this press has been operating, "practically no maintenance has been necessary."

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in modern production! Farquhar Presses are built for the job . . . assure faster production due to rapid advance and return of the ram . . . greater accuracy because of the extra guides on the moving platen . . . easy, smooth operation with finger-tip controls . . . longer life due to positive control of speed and pressure on the die . . . long, dependable service with minimum maintenance cost.

Farquhar engineers are ready to help solve whatever production problem you may have. Send for free catalog showing Farquhar Built-for-the-Job Presses in all sizes and capacities. Write to THE OLIVER CORPORATION, A. B. Farquhar Division, *Hydraulic Press Dept.*, 1506 Duke St., York, Pennsylvania.

Farquhar HYDRAULIC PRESSES

THE OLIVER CORPORATION, A. B. FARQUHAR Division

ROUND TABLE *Discussion*

WHO RATES THE BOSS?

Is a foreman-rating card, to be filled out by the shop men, a healthy idea for general morale? Would such a policy result in overboard criticism, or might it not bring to light a few weaknesses which the foreman could easily correct?

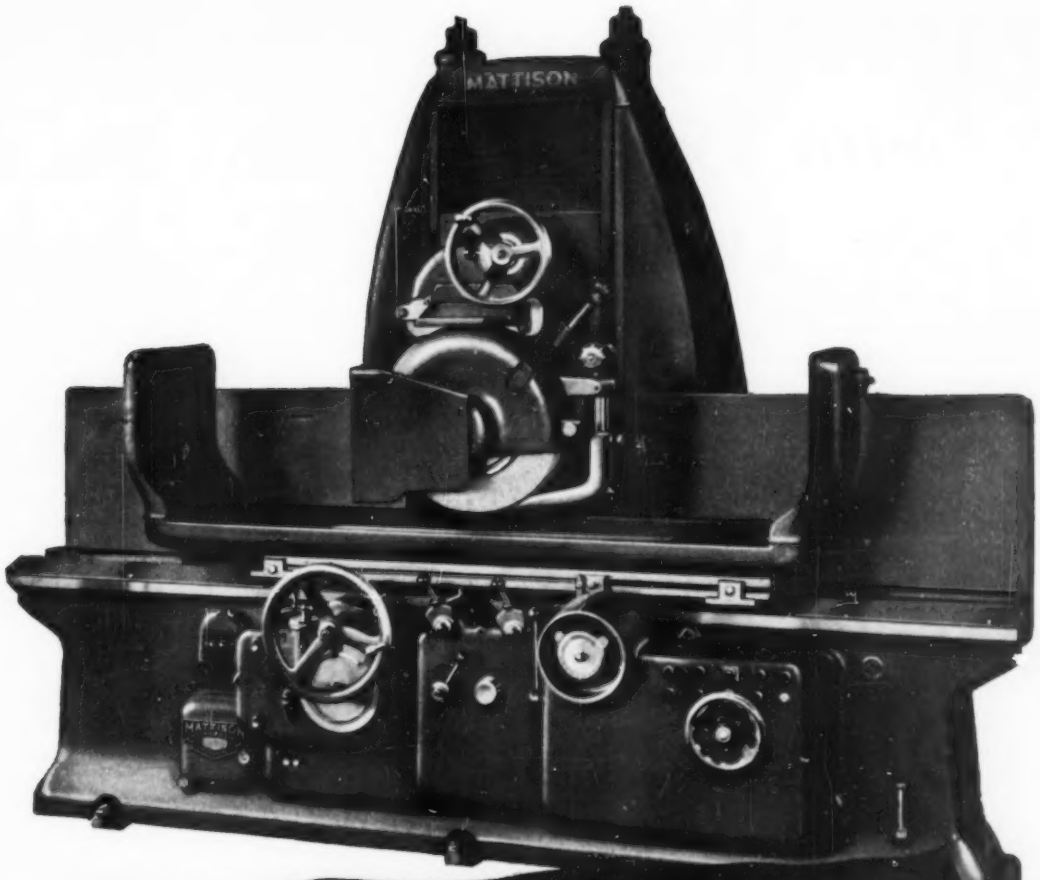
ONE'S INITIAL REACTION on reading the first paragraph of your Round Table topic on the rating of the boss is to recall the fable of the spider and the fly, with Al as the kindly, but expectant spider, and the machinist as the fly.

If Al's apparent kindliness had not been swallowed up by the emergence of a hungry and somewhat vengeful spider, his plans might have stood a better chance of success, but in his eagerness he seems to have been too precipitate. He should copy the spider and lie in wait until the flies, in their admiration for the beauty of his web, get so entangled in its toils that they cannot escape; then he should pounce, and let them know who's who. Otherwise, they may see only the artifice, which is not too well concealed, and be warned off.

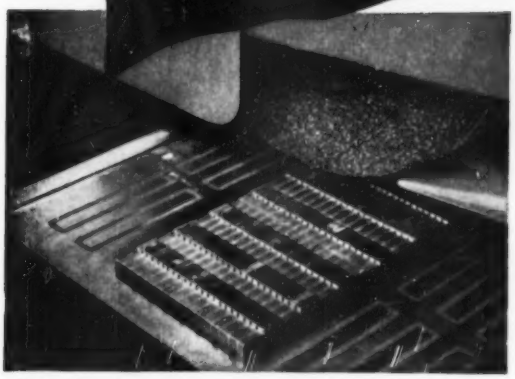
If only Al could contain his impatience, he might get the most wonderful tributes. He might learn of the enormous success which some of his "admirers" feel ought to follow the working out of the plans which could emanate only from a brain so colossal as his, and which must react to the benefit of all concerned.

It could be imagined, in the swell of his first resultant emotions at the implied possession of ability so great, that Al's hand could stray unconsciously to that part of the body where it might be thought the first signs of sprouting wings could be expected to appear.

It might be wise, however, to consider the possibility of such tributes not being 100% genuine, and for different reasons; fear on the one hand, and deception on the other. Neither the timid, nor those who are content to shilly-shally would be willing to risk their heads in the mouth of a spider; they will play for safety, and pull Al's leg. The men whose opinions are most worth having will either dissemble or ignore entirely such a doubtful proposal.



HERE'S A CHANGE THAT INCREASED PRODUCTION FROM 30 PER HOUR TO 200 PER HOUR



Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production — 30 per hour.

● Because of the greater load and grinding area of their Mattison High Powered Precision Surface Grinder, Geo. T. Schmidt, Inc., Chicago, Illinois have been able to effect considerable savings in grinding time over their previous method. As an example — the type stamps shown in the picture above were formerly ground a few pieces at a time on a small grinder — 30 per hour. The Mattison Grinder they are now using provides larger table space and a larger grinding wheel together with the necessary power and stability to permit the grinding of more pieces per load at a production rate of 200 per hour. Similar results are obtained on other parts.

Mattison High Powered Precision Surface Grinders have the high power and rugged double-column construction for rapid stock removal and the precision necessary for high quality finish and accuracy to close limits.

This combination not only will enable you to step up production on small parts, but permits grinding large work which previously could not be handled. For further information send for free circular.

MATTISON MACHINE WORKS

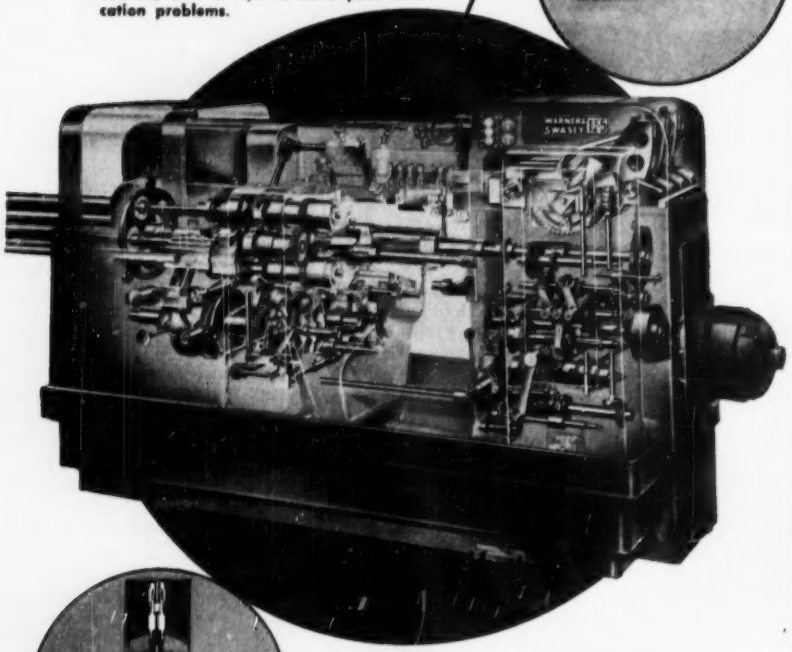
ROCKFORD · ILLINOIS

PRODUCTION *Plus with* BIJUR LUBRICATION*

Modern machine tool manufacturers take justifiable pride in building constantly increased production and accuracy into their machines. As rates and standards increase, adequate lubrication becomes essential. To safeguard 41 important bearings on their 5-Spindle Automatic Bar machine, Warner & Swasey, one of America's leading manufacturers, *standardizes on Bijur* lubrication. Because Bijur delivers predetermined, *metered* lubrication *automatically*, the number of manufacturers and users who specify Bijur as standard equipment is constantly increasing throughout industry.

If you're looking for longer machine life, lower maintenance, and increased production, look to Bijur to solve your lubrication problems.

*** Standard Equipment on Warner & Swasey's 5-Spindle Automatic Bar Machine**



BIJUR
LUBRICATING CORPORATION
Rochelle Park • New Jersey
Pioneers in Automatic Lubrication

N-11

261

A man with a little mind, as Al's evidently is, cannot be trusted. The true boss leads and needs neither prompting, nor to be fawned upon—to which Al is unlikely to say Amen.

J Wardell
Lincoln, England

•

CAN A MAN STEP DOWN?

Is it a reflection on the foreman when a man he has picked for his assistant must be demoted? Will he be blamed for his initial poor judgment? Will the worker be more likely to resent the demotion, or realize that he was not yet quite ready for the job? Readers' opinions vary . . .

A GOOD SUBJECT, very poorly supported by Al's evidence and his attitude.

The answer is yes, when that step is necessary, and therefore justified. Carried out with dignity, with no sign of derision or contempt, no bad feelings need be engendered, but will be, if carried out as Al thinks of Bingham.

A summary of Al's attitude and outlook is illuminating. Al seems to be unstable in character and action, and of poor judgment. He upgrades a man to be his chief assistant, thinks he is so good that he leaves him in sole charge of the department for two weeks while he is away—either a tribute to Bingham, or a condemnation of himself. On his return, and after, he thinks Bingham has done well; then he listens to gossip, which might be idle or malicious, possibly prompted by jealousy or envy; he believes this and thinks he must get rid of him, and asks him to step down.

He then becomes ponderously

"Young man, you come late once more and I'll just have to, -to—er—buy you an alarm clock!"

Specify

PEERLESS HIGH SPEED EXPANSION REAMERS

...For
- ECONOMY
- LONG LIFE
- BETTER FINISH
- GREATER ACCURACY

When the reamer becomes dull, it may be put back into its original serviceable condition not once, but many times, by expanding and resharpening.

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E. P. Barrus, Ltd., London W. 3, England

—Mr. G. J. Werner, Traffic Manager, Motorola, Inc., on screen of new Model 21T4.

"Our program never goes off the air!"

"Tens of thousands of component parts . . . thousands of suppliers all over the country . . . a daily 'hot sheet' of critical items needed within 24 hours or less . . . that's just a glimpse of our traffic picture at Motorola!

"Yet our production lines never stop for lack of available parts — because our production program never goes 'off the air.' We use Air Express! With our tremendous, and steadily growing overall shipping volume, there is daily need for this top-speed, *reliable* service.

"Many times a day, we specify Air Express — and exacting production schedules are met. Show models, advertising matter, itinerant displays and penalty contract shipments are always subject to deadlines—and Air Express gets them there on time.

"Shipping costs are secondary on such shipments. Yet we find that Air Express costs compare favorably with other air services. In many weights and distances, its rates are lowest of all!

"Day in, day out, Air Express is an integral and important cog in Motorola's overall operation."

Whenever you ship by air, it pays to say—Air Express! Division of Railway Express Agency.

AIR EXPRESS

GETS THERE FIRST

via U. S. Scheduled Airlines

wise. He fears what Bingham may or may not do if degraded, and what his own higher-ups may think of his selection, his subsequent trust and praise, and eventual condemnation. Having turned a complete somersault, he fears they will think he is a bum picker.

Is he not, and are not those same higher-ups guilty of the same fault? *They* selected *him*, and if ever a man proved his incapacity, surely Al's attitude toward Bingham could not be surpassed. Loyal to nobody, and fearful only for himself—a real yellow. Al's real enemy is Al, and his troubles only skittles of his own erection.

The remedy would appear to be the removal of Al, and his replacement by a man of intelligence, with ability to control, of a character strong enough not to be swayed by mere gossip, able to look down calmly and unmoved at the tittle-tattlers below.

Such a man would be able to degrade, if necessary, without the hurting of feelings, or making a song about it.

It is wise to remember that like attracts like. A foreman of good type is likely to attract men of similar character to the eventual benefit of the firm employing them.

At the beginning of the century, a well-known man, asked as to what he considered was the greatest need of the times, gave his reply in one word—men. It still is, but their names would appear not to be Al.

P E James
Lincoln, England

•

PRIVACY, PLEASE

Does working in partitioned enclosures tend to increase efficiency? Will the men resent being stalled off and separated from their fellow-workers? How does semi-privacy affect concentration—favorably or unfavorably?

YES SIR, privacy always, when privacy is needed. An old man would hope, if the subject may be considered broadly, that none of the former, entirely indecent, semi-public lavatory arrangements of the past generation now survive.

And yet the topic of your Round Table is not entirely unrelated to the discreditable matter mentioned. The men concerned were of the same class, but whereas they would seem then to have been considered as being a little—but only a little—higher than the animals, now the

WERNER

#5 and #6

VERTICAL

MILLERS

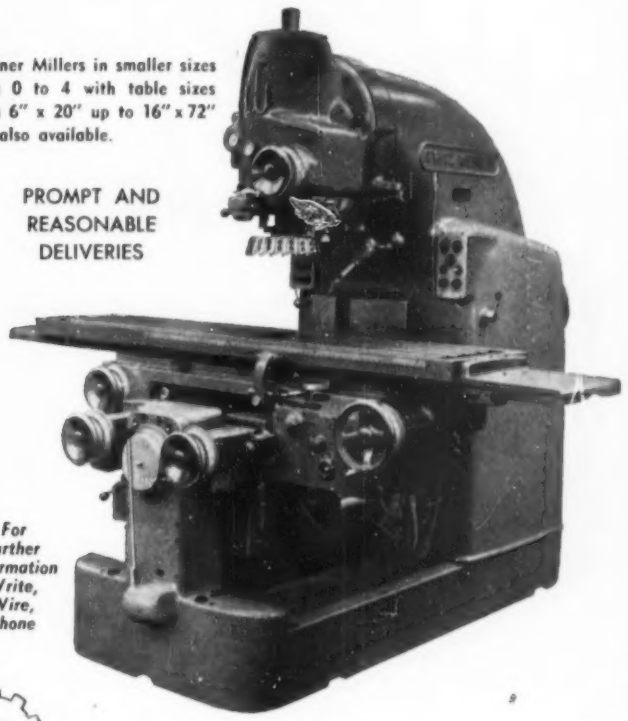
#5 Table 20" x 90" #6 Table 20" x 110"

Both are equipped with a 40 H. P. or an optional 50 H. P. motor for the spindle drive.

Spindle speeds range from 16 R.P.M. to 1800 R.P.M. Feeds range from 9/32" per minute to 80" per minute.

Werner Millers in smaller sizes from 0 to 4 with table sizes from 6" x 20" up to 16" x 72" are also available.

PROMPT AND REASONABLE DELIVERIES



For further information Write, Wire, Phone

MARAC machinery Corp.

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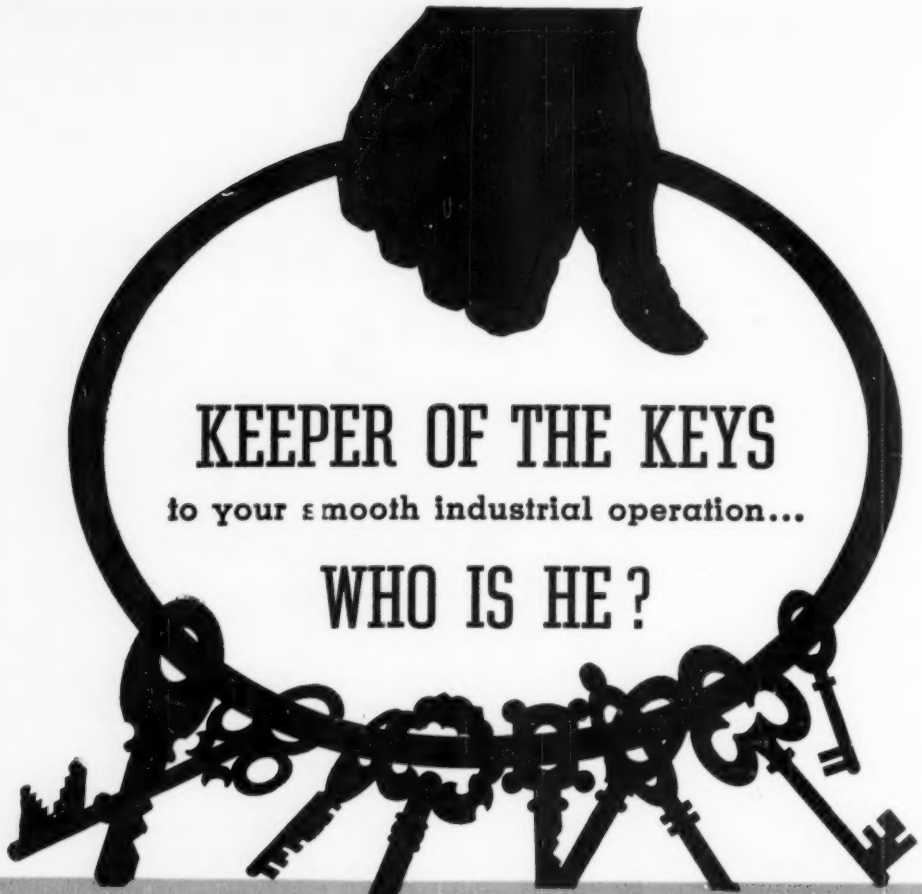

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to your smooth industrial operation...

WHO IS HE?

He is your Industrial Distributor.

He is your nearest, quickest, surest source of supply for countless items you need to keep your plant on the go.

He carries a myriad assortment of tools, machines, parts, accessories and manufacturing staples—in the right types, designs, grades and sizes you require.

He is able to deliver them to you in less time than it would usually take for you to order and obtain them from their original source.

He warehouses huge stocks—many of them items of long-interval demands which otherwise would tie up your own capital (or expose you to the risk of shut-down, interruption or slow-up).

He knows where and how to obtain scarce or sorely needed operating requisites—thus sparing you the time, expense and tedium of searching for them yourself.

He explores the globe for new and improved equipment, appliances and other items that may speed up your production and cut your costs.

He has a reservoir of information about tools and machines from which you can benefit year after year.

As a "clearing house" for all your plant-operating requisites within the foregoing scope, your Industrial Distributor can take over from you a lot of costly bookkeeping—and headaches.

By serving many industrial consumers he also serves many producers, thus reducing *their* "paper work" too... which consequently enables them to pass further savings along to you.

YES, the industrial distributing system has so many advantages to all who use it that it is an indispensable and valuable factor in the economics of free enterprise. Nicholson continues to subscribe to its principles in both words and action.

NICHOLSON FILE COMPANY

PROVIDENCE, R. I. (IN CANADA, PORT HOPE, ONT.)

NICHOLSON U.S.A.

World's foremost manufacturer of
FILES FOR EVERY PURPOSE

same men would appear to be but little lower than the angels.

It is unnecessary to take exception to this, but it does seem desirable to make certain that all chages made connote real improvement, more or better output, or improved working conditions, a permanent contribution to the structure of industry.

As a boy in the last century, the writer was taught by a village schoolmaster whose academic qualifications would be unlikely to get him a job today, but the boys of his teaching were often better equipped at 12 than were many boys of 15 in the '20's and '30's of this century, instructed by certified teachers.

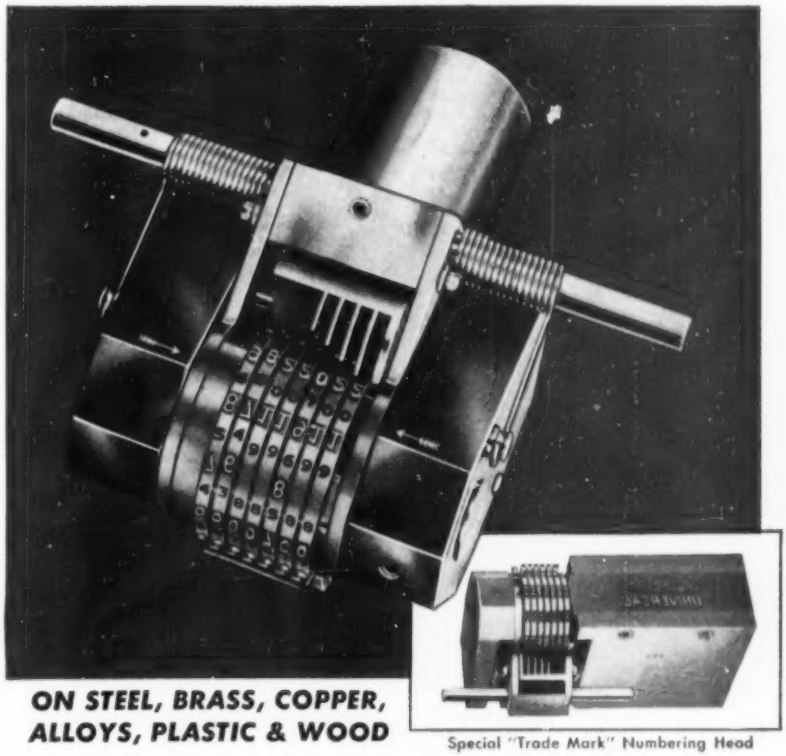
Qualifications must be judged by the results, and if to give workmen cubby-holes be the policy of the moment, let cubby-holes be tried, but do not expect a revolution in anything as a result. When the writer worked in the shops he felt as little interest in his fellow workmen when working as probably they did in him. We were too directly engrossed.

Is it possible that the suggested partitions are the idea of some eager doctrinaire? If so, it may be wise to remember that while his head may be in the clouds, his feet may have no sure ground, and his anticipated results may be only moonshine. It is so easy to imagine that a vague shadow has real substance, and the disappointing results to the dog and his bone in the old fable need no reminder.

P E James
Lincoln, England

"That's the younger son—not yet a wheel, but we like to refer to him as a hoop!"

Numbers...
FROM 1 TO 99999999



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Special "Trade Mark" Numbering Head

AND THAT'S NOT ALL...

these new Parker numbering heads for punch press stamping come in four to ten digit models and stamp consecutive or repeat numbers cleanly and sharply into the most rugged stock. A simple duplicating attachment can be added if required and a compound numbering head can be manufactured to your specifications to embody a trade mark, name or group of symbols to be stamped in one operation.

The larger heads have a direct reading feature which enables determination of machine setting at a glance from engraved numbers on the front of lettering wheels. Here is another instance of Product Flexibility. Let Parker's expert craftsmen and eighty years of experience solve your marking die and stamping problems too!

SEND FOR PARKER'S NEW CATALOG NOW!

Be sure to have this fact-filled brochure describing hundreds of Parker stamps and marking dies in your file.

THE PARKER STAMP WORKS, INC.
MARKING DIE & MACHINERY DIV.
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Need precision performance?

No question about...

Bay State Taps!

...on nearby shelves of industrial supply distributors.

BAY STATE TAP & DIE COMPANY • MANSFIELD, MASS.

Tangents by Tange

COLOR

There are those who, around our office, wrinkled their noses at the burgundy color for our current Special Report on Sylvania. Fortunately, there were those also who uttered loud hosannas. Our approval of the intelligence and artistic appreciation of the pro group was dimmed a bit when we discovered that the most vociferous of our adherents had thought initially that the color was black; he's red-green color blind.

We chose the color because offset printing was to be used, making it possible to get the color with enough intensity to make the halftones (reproductions of photographs) show a lot of detail.

Which brings us to the whole business of why we publish Special Reports in a color other than black. Adherents of the cause of black point out that black on white gives maximum contrast and readability (it doesn't—black on yellow does, but would you read a yellow journal?), and that photos reproduced in other than black lose detail.

That's right; color does cut contrast from 15 to 40% or more, depending on what color is used. But a good color—meaning a relatively dark one that's still pleasing in hue—gives the page life and provides a quick means of identification, makes sure you notice that it is special. What we're trying to do is to get *you* to read as much of the Report as possible. Good illustrations, clear and succinct writing, proper arrangement, legible type face and size—all these help, assuming the information is worth reading in the first place. We think that printing the Report in color provides contrast.

Your reaction to our Reports these past eight years has been very favorable, indicating that our reasoning is right. Or it may indicate—horrible thought—that the Reports have been so good that you liked them in spite of the color.

Times have changed in providing

technical information, as in many other fields. Time was when technical data could be dished up any old way; it was the key to success. Like castor oil, it was necessary although unpalatable. What's more, there were fewer distractions.

No more. Now there are movies, radio, TV, general magazines, all offering information or entertainment in easy-to-take form. General educational level is higher, so resistance to self-improvement after high school and college is greater. What's more, the average shopman is far busier. Thus the technical magazine must compete for readership. The castor-oil taste must be disguised by good writing, good art, good layout, elimination of words or thoughts that add nothing to the idea. That's what we're up to—to give you what you need, in as short a compass and as interestingly as possible.

Which indicates that we can go on quite a tangent when discussing color in Special Reports. It almost seems that all the burgundy didn't go into the ink.

EARTH-SHAKING

With increasing frequency since WW II mushroomed a crop of public-relations men, our mail includes manuscripts purported to convey the greatest development in engineering since Hero reported the aeolipile of Egypt would grow into the steam turbine of modern times. The writing is usually excellent, as are the pictures, but, frequently, the story itself turns out to be slightly overrated—not even the greatest invention since the phonograph or the telephone, neither of *them* unalloyed boons. What's more, the story has a queer habit of mentioning one company or trade name repeatedly, somewhat on the apparent radio-commercial theory that "what you say doesn't have to be good, needn't be true—as long as you say it often enough."

Sources of such articles profess the greatest astonishment when we point out they're not for us, that our readers have learned to expect facts in our pages rather than publicity fancies, that the "angle" or "hook" can be missing in a story for us if the guts are there. Seems never to have occurred to some that the editorial content of a magazine should have as its sole function the interesting of a cohesive reader group, and that competitive and sales information properly belongs in paid advertising with the advertiser's name at the bottom. Then there's no question of source, and no question of editorial integrity.

We help our customers write success stories

Every day 200 Oakite Technical Service Representatives use Oakite cleaning materials and methods to help thousands of Oakite customers accomplish metal-cleaning jobs that are important parts of big production operations.

When a busy customer sends a few words of appreciation, we treasure those words as a *success sentence* that we have helped write in his *success story*.

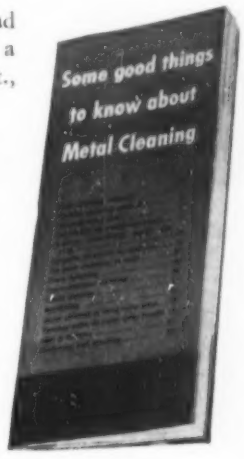
Here are brief explanations of the *success sentences* quoted above:

1. After 6 months use of Oakite Special Protective Oil for preventing rusting, this manufacturer of precision steel parts estimated savings at more than $6,000.
2. The use of Oakite Composition No. 95 for conditioning zinc-base die castings before plating cut cleaning rejects for this hardware manufacturer and showed other "very fine advantages."
3. Oakite CrysCoat HC put a heavy phosphate coating on 385,000 shells with "absolutely no trouble" according to a munitions maker, who added that "maintenance and control are very easy."
4. For burnishing, "Oakite Composition No. 3 is here to stay" says this maker of aircraft instrument parts, who adds "Pinions are polished to the roots of the gears. Magnesium parts are brilliant."

How about your success story? We'll be glad to tell you how we can help. Just drop a note to Oakite Products, Inc., 24 Rector St., New York 6, N. Y.

FREE Ask for our booklet "*Some good things to know about Metal Cleaning*." It discusses our methods for:

Tank cleaning	Pre-paint treatment
Machine cleaning	Burnishing
Electrocleaning	Paint stripping
Pickling, deoxidizing	Rust prevention



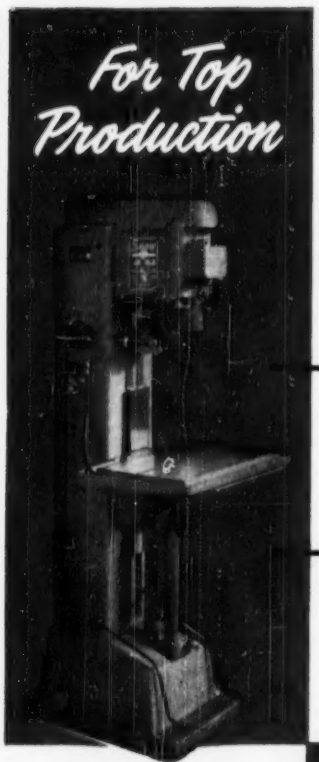
SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!



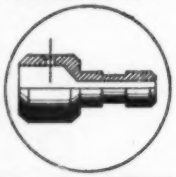
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

Cross-drill and C'T" Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine

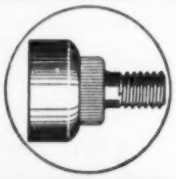


TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine

THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW

MANUFACTURING COMPANY
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts f

When confronted with this reasoning, some PR men protest, "But our ads don't get the readership that your articles do." Seems never to occur to them that their ads may be at fault, and the editor who plays catspaw in offering some advertiser's merchandise soon loses the readers the advertiser pays good money to reach. As somebody said long ago, "You can't have your cake and eat it too."

We *like* PR men; they can be eyes and ears right on the spot where things are happening, can help make up for our physical inability to be everywhere at once. We *like* them to send us articles. They help us break down the archaic belief that there are still such things as "trade secrets," that new ideas must be carefully hidden, that you should talk of your products but not of how they're made. They know that the first man to learn your secret process is your competitor, the last is your customer.

But we must respectfully point out to the "pressure group" among PR men that we get paid on the supposition that we maintain a perspective point of view, that we show no bias or favoritism. If we do one PR man a special favor today, a competitor will insist on another and bigger one tomorrow—and first thing each suspects he's getting the short end of the stick. The result would be chaos in the advertising department. Meanwhile, we'd lose face and break faith with you, and that would create chaos in our personal budget. And we still like to eat.

As *Esquire* editors put it in January, 1936:

"Occasionally we lose advertising, and more frequently we are threat-

"—And another thing—I think the morale would improve around here if you didn't transport our production in garbage cans."

Take some of the pressure off hydraulic press maintenance with

GULF QUALITY HYDRAULIC OILS

A recent investigation into the causes of down time of hydraulic equipment revealed that an estimated 90% of all down time can be traced to the condition of the hydraulic oil. This is right down our alley because we at Gulf know from experience in hundreds of plants that it pays to use only top quality oils in hydraulic systems—oils that will not sludge, and that protect against rust. Saving a few cents per gallon on the initial fill is false economy!

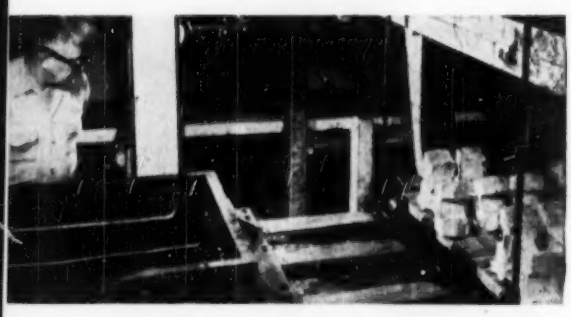
For complete information on Gulf's line of quality hydraulic oils, ask a Gulf Sales Engineer to call. Write, wire, or phone your nearest Gulf office today.

GULF SERVES INDUSTRY

Gulf Oil Corporation · Gulf Refining Company
Pittsburgh 30, Pa.

Picture shows how oil that forms sludge can clog cooler. Sun Quenching Oil's natural detergency helps prevent such sludge formation.

Oil Coolers Don't Clog with

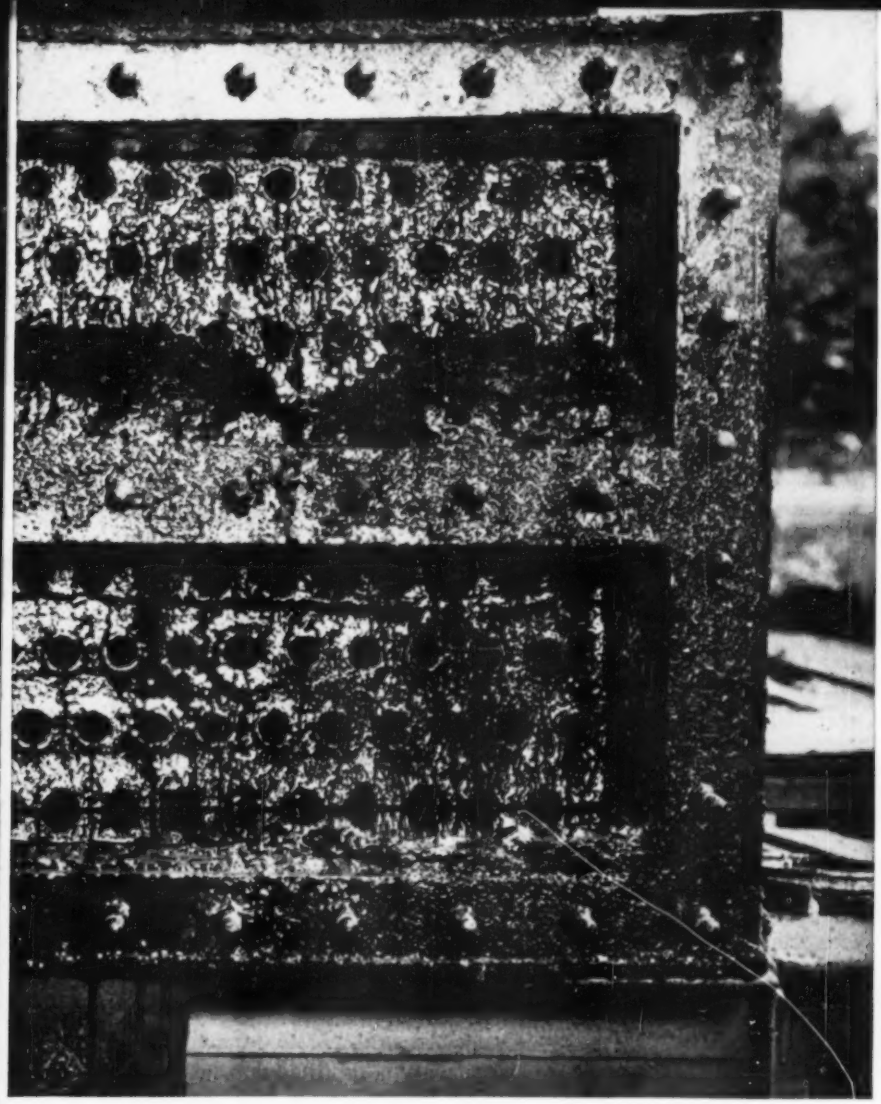


A New England firm uses five 2400-3000 gallon systems to quench all types and sizes of aircraft and automotive forgings. Since Sun oil was adopted 7 years ago, not one system has required cleaning except for normal removal of mill scale.

Sun Quenching Oils keep oil coolers clean. Teardowns are fewer and maintenance costs less. This is because Sun oils have a natural detergent action that prevents the formation of sludge and aids in removing any deposits that exist.

Can Handle 95% of All Quenching Jobs

Tests show that Sun Quenching Oils give better all-around results. For one thing, they assure hardnesses far above the commonly accepted minimum requirements. In any system that provides normal agitation, they can handle 95 per cent of all quenching jobs.



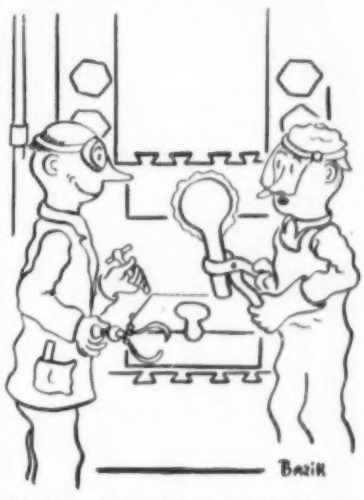
Sun Quenching Oil

Sun Quenching Oils Reduce Operating Costs
Sun oils thin out when heated, drain off parts faster and more completely. Dragout is reduced to a minimum. They do not thicken up, and under normal operating conditions need never be replaced. For more information about Sun Quenching Oils, call your nearest Sun office or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. AM-4.

INDUSTRIAL PRODUCTS DEPARTMENT
SUN OIL COMPANY
SUNOCO®
PHILADELPHIA 3, PA. ◆ SUN OIL COMPANY LTD., TORONTO & MONTREAL

ened with the loss of advertising, over the undue exuberance of some part of our editorial content. Whenever this happens the advertising department turns on us with that special look otherwise reserved for the use of front-line troops when fired upon by their own artillery. 'Hey,' yells the adv dept, 'cut that out!' And we always murmur, 'Sorry, but we want to have a lively magazine.' The adv dept grumbles, 'The advertisers don't! The advertisers would much rather see a little editorial cooperation!' And then there's *Tension*. The adv dept nurses its wounds, and we get to brooding and talking to ourselves. Like this: We do want a lively magazine, because a magazine must be lively to get talked about, and getting talked about gets circulation, and getting circulation gets advertising. Sure we want advertising, as much as the adv dept does, because that's the fruit on the magazine tree. But it grows on the topmost boughs and you have to climb up after it. That is, unless you want to chop the tree down. Or look at it this way: Advertising rests on circulation, which rests on reader acceptance, which rests on editorial vitality. They're piled one on top of the other like the baby's blocks on the floor. The bottom block is editorial vitality, and on it are piled reader acceptance, circulation and advertising. Advertising's the top block. You can jiggle that one, and even knock it off, and the structure still stands. But jiggle the bottom block and the other three come tumbling. That's what we'll have to try to explain to the adv dept sometime.

"They keep telling us how the other magazines give their advertising departments a break through



"My high school year book said I would forge ahead in industry."

. . or Released in an Instant

Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

Bolt threads are gripped tightly . . . these famous nuts *never* work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study *your* fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

Write
GREER STOP NUT CO.
2620 Flournoy Chicago 12, Ill.

'editorial cooperation,' how *Chic*, and *Luck*, and *City & Village* run photographs of things and places that do the advertisers some good, and how that makes the advertisers very happy, without hurting the readers the least little bit. And sometimes, when we are especially weary of hearing how this story cost us $2000 in lost or cancelled revenue, and that cartoon $1000, and that article $3000, and how *this* offended *that* advertiser and how *that* scared off *this* prospect, we begin to think of how easy it would be to give a little cooperation and to avoid giving any offense. Every month we get scads of free photographs and even free articles, from interested sources. Maybe we ought to be more reasonable about using them. It would be so much easier, as well as so much cheaper, to fill our pages. And the advertising would undoubtedly show an immediate pick-up, because usually the promise of advertising is at least inferred or implied when slanted editorial material is offered.

"But would that stuff be interesting? Well, at least it wouldn't hurt us. It wouldn't have cost us $3000 lost revenue, like the article which it might so easily have replaced. Was that article *that* interesting? Did that article help us $3000 worth? Or would it have hurt us $3000 worth to have run a little safe and sensible slanted stuff in that particular space? Three thousand dollars is a lot to pay for the privilege of exhibiting just one specimen of 'editorial vitality'! And besides, when we had forty-odd legitimate editorial features, which made the issue on their reader interest, would it have hurt us to have just one phony in there, just one piece that would have made an advertiser happy instead of angry? Anyway, would it have hurt us $3000 worth?

"Think about it this way long enough and you feel yourself placed between the devil and the deep blue sea.

"But still, if you were selling apples at the roadside to passing tourists, in large baskets containing forty-odd apples each, would you put one rotten one down somewhere in the middle, on the chance that it wouldn't be detected? No, because one rotten apple, in the course of a long day spent standing at the roadside, can begin to turn the whole pack.

"Think about this long enough, and you realize that nobody ever beat the devil at a bargain. But plenty of people have learned to swim." —TANGE

the smith had the right idea

When it comes to forming metals, there's no substitute for the hammer. No other method gives metal equal toughness and resiliency.

The Torrington Swager operates on the same principle—delivering 4000 hammer blows a minute. It reduces, tapers and points rod, wire and tubing accurately and economically . . . using every ounce of stock.

Our booklet, "The Torrington Swaging Machine," gives full details on swaging and our complete line of machines. A free copy is yours for the asking.

THE TORRINGTON COMPANY
Swager Department
559 Field Street • Torrington, Conn.
Makers of
TORRINGTON NEEDLE BEARINGS

HY-PRO SPECIALIZES IN TAP ENGINEERING!

...to give you better prices and service

Tap production is specialized at Hy-Pro. Because taps make up the great portion of our output, it enables our engineers to constantly direct their technical know-how and creativeness toward the perfection of this one important line. Such close attention to every phase of tap design and production has helped build Hy-Pro's reputation as the "tap specialist."

These engineers are always ready to help you with any problem—from a special need to one in your regular operation.

Call or write us today. Hy-Pro's full line of taps is backed by the proven reputation and experience of these engineer specialists.

REG. U.S. PAT. OFF.

HY-PRO

HY-PRO TOOL CO., NEW BEDFORD, MASS., U. S. A.

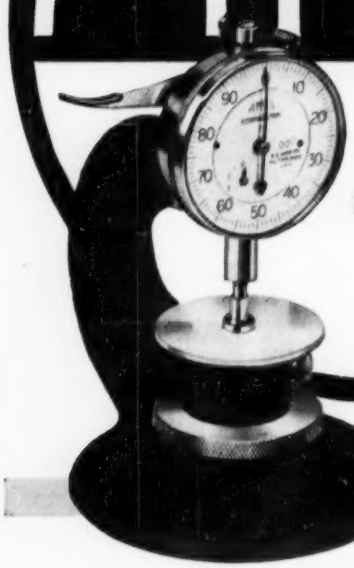
ADDITIONAL WAREHOUSES:

6046 College Ave.
OAKLAND 18, CALIF.
Piedmont 5-4337

10428 W. McNichols Rd.
DETROIT 21, MICH.
University 4-1077

6141 North Elston Ave.
CHICAGO, ILL.
Newcastle 1-6486

AMES



No. 2
Dial Comparator

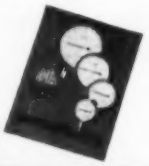
This is smallest in the Ames' line of high quality dial comparators and it is ideal for desk or bench use in the fine inspection of small precision parts. It is light in weight, but its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a dial numbered 0-100, graduated in .001" and with a .250" range. Should your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for Ames Catalog No. 58 covering the entire line of Ames Top Quality measuring instruments or, better still, send complete details of your Quality Control problem. Ames will suggest a solution – no obligation, of course.

Ames Long Range Dial Indicator No. 2822

Ames Dial Micrometer No. 516

Ames Dial Comparator No. 130

Ames Caliper Gauge No. 12B



Send today for your free copy of Catalog No. 58

Representatives in principal cities. B. C. AMES CO. *24 Ames Street Waltham 54, Mass.*

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators

NEW BOOKS

ASTM SPECIFICATIONS FOR STEEL PIPING MATERIALS—*Published by the American Society for Testing Materials, 1916 Race St, Philadelphia, Pa. 394 pages, including appendix. Price $3.75.*

Fifty-six ASTM specifications are given for carbon-steel and alloy-steel pipe and tubing, including stainless. Materials covered include: pipe used to convey liquids, vapors and gases at normal and elevated temperatures; plus tubing used for various purposes.

•

ASME SCREW-THREAD MANUAL. *Edited by Henry R Cobleigh, standards engineer. Published by the American Society of Mechanical Engineers, 29 West 39th St, New York 18, NY. 62 pages. Price,* $2.50.

Written for the convenience of the shop and drafting room, this manual represents an abridgement of two American Standards: ASA B1.1 — 1949 — Unified and American Screw Threads, and ASA B1.2—1951 —Screw Thread Gages and Gaging. The manual retains all of the information essential to designing, making and inspecting the threads constituting the bulk of usage. These threads are coarse, fine and 8-thread series of classes 2A and 2B up to 1½ in. dia. Further data make it possible to calculate all other standard threads and gages in the ASA Standards, and all special threads of the A and B classes, except those of abnormal diameter, pitch or length of engagement.

A particularly handy table shows

"Woops! Hurt yourself, Ed?"

for each diameter what pitches of thread are available in each of the six series of standard threads. Another table provides the formulas for all major pitch and minor diameters of the six unified classes.

Editor Cobleigh and the ASME Standardization Committee have therefore done an excellent job of sifting out essential information on threads for use of the shop man and the designer. The two standards previously mentioned are so comprehensive that their use by the practical man would prove a chore.

•

STRUCTURE OF METALS *(Second Edition) — By Charles S Barrett, PhD, professor, Institute for Study of Metals, University of Chicago. Published by the McGraw-Hill Book Co, 330 West 42nd St, New York, NY. 661 pages. Price $10.*

Metals have a crystalline structure, and this book gives the advanced student the fundamentals of crystal lattices and projections and the means for examining crystal structures. For example, considerable information is given on X-ray diffraction, electron diffraction and their metallurgical uses.

The practical man who wishes to extend his grasp of metallurgy can gain from the above material. And especially valuable is the underlying theory for plastic deformation of metals and the structure of cold-worked metal. Another subject which is of growing importance in practical metal forming is that of preferred orientation of crystals or grains, as resulting from cold work.

•

ENGINEERING MANUFACTURING METHODS—*By Gilbert S Schaller, professor of mechanical engineering, University of Washington. Published by the McGraw-Hill Book Co, 330 West 42nd St, New York 17, NY. 613 pages. Price $7.*

This book is intended as a text for mechanical engineering students in order to provide them with some understanding of basic methods of fabricating metal parts — foundry work, press work, machining and welding. While the author attempts to explain the principles involved, he has relied heavily on photographs for illustrations. Most descriptions are very short, as one must expect in trying to cover so much ground in one volume. The book is therefore primarily of interest to college stu-

Get the graphic story. . . . Nelco carbide tools assure faster, better, more profitable production.

Nelco Tool versatility—actually your assurance of *special tools at standard prices*—is shown in the nearly 800 carbide cutters Nelco regularly maintains in stock. In the Nelco line of 4 flute end mills alone, there are available 63 standard cutters in diameters from ⅛" to 2".

Diamond-hard carbide swiftly chews through the toughest metals—works to closer tolerances and leaves finer finishes than conventional cutters. Higher table feeds mean MORE production. Costly down time is slashed! Nelco tools stay sharper longer—mill more pieces per grind. Nickel shim brazed carbide tips on alloy steel bodies mean year after year of service free operation.

Nelco SERVICE extends directly into your plant! An experienced Nelco field engineer will be glad to discuss, suggest, troubleshoot *in your plant, on your machines.*

Unusual, out of the ordinary tools described in this catalog can be designed or built to your specifications by Nelco carbide technicians.

NELCO TOOLS
For that Extra EDGE in Production
NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

"Looks like someone swiped another one of Pete's Columbia Molite Cutters!"

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels—High Speed Steels
Die Steels—Hot Work and Shock Resisting Steels
Carbon Tool Steels.

TOOL COLUMBIA STEELS

Carter MICRO-GUIDES
STANDARD EQUIPMENT ON
DELTA-CRESCENT
BAND SAWS

(Delta-Crescent 36" Band Saw)

More and more leading band-saw machine manufacturers are standardizing on Carter Guides for economical, trouble-free operation.

•Write for Catalog

CARTER PRODUCTS COMPANY, INC.
429 Wm. Alden Smith Bldg., 30 Ionia Ave., S. W.
Grand Rapids 2, Michigan

A MODERN GUIDE FOR A MODERN SAW

dents and persons who, connected in a non-technical capacity with the metalworking industry, wish to increase their understanding of the basic methods and equipment used in this field.

•

PSYCHOLOGY OF INDUSTRIAL RELATIONS—*Edited by C H Lawshe, professor of psychology, Purdue University. Published by the McGraw-Hill Book Company, Inc, 330 W 42nd St, New York 36, NY. 350 pages, 6x9 in. Price $5.50.*

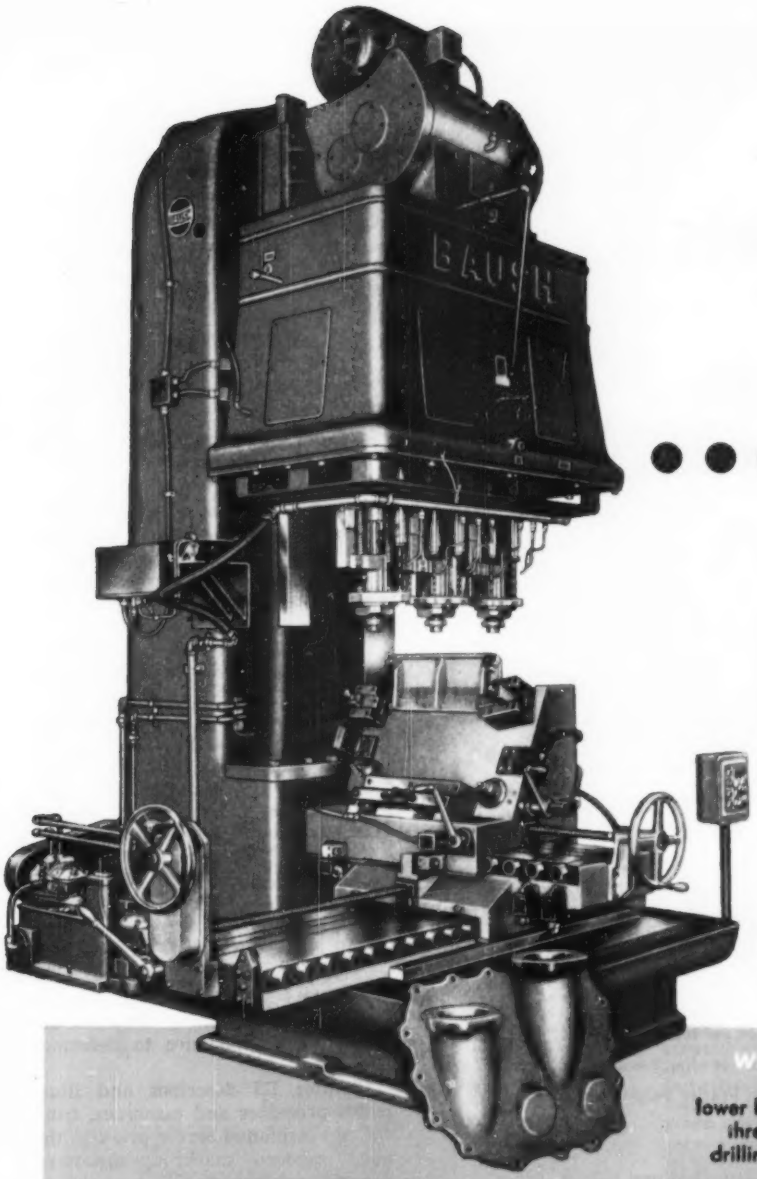
This reviewer was advised against taking psychology at Purdue during his senior there because "the first two semesters of psychology are devoted principally to learning definitions and names for things." That was almost a quarter-century ago, and Dr Lawshe was at that time a classmate and fraternity brother, studying psychology and science.

Through the years between, he has become known in industry for his work in industrial psychology and personnel relations, and has undoubtedly faced many times the shop executive who, like this reviewer, never learned the names or definitions, but must use psychology every day. This book is designed to meet that need. It brings practical psychology to practical men, in layman's language for easy understanding.

Included are such subjects as human behavior, employee placement, training, supervision, complaints and grievances, counseling, employee efficiency, wage administration, employee and group relations (between men, and between management and union), and finally, human beings in industry.

Professor Lawshe was assisted by

"Get the whole vegetable garden in over the weekend?"



CUT COSTS ....SPEED UP WORK

with BAUSH Multi-Spindle Machine Tools . . .

. . . just as one large defense plant is now doing with this Baush Vertical 'W-7 Type' Hydraulic Multiple Spindle Drilling Machine

This unit is furnished with 20" x 45" rectangular head, of the joint driven type, on which is mounted a master bored cluster plate having (14) 2" diameter slip sleeve type spindles.

What it does: **This unit is arranged to drill and countersink holes in both upper and lower bosses of heavy CAST STEEL housings. It has three (3) groups of spindles to perform fourteen drilling and countersinking operations in three (3) successive work positions:**

Position #1 — Drill two (2) holes ¾" dia.
Position #2 — Drill six (6) holes for ½ x 13 tap
Position #3 — Countersink six (6) holes for ½ x 13 tap

Both machine and fixture are designed to handle either R.H. or L.H. housings.

How it does it: **Parts load into fixture out from under head to the left of machine. Parts set against an angle plate type fixture, locating from two (2) moveable pins which enter the reamed construction holes and are clamped to plate with planer type clamps. Fixture proper is mounted on a double slide, (left to right and front to rear), which is positioned by hand operated electrically interlocked shot bolt. Slide operates by screw and hand wheel. Individual bushing plates are furnished at each work position with guide bushings for all the tools. These plates rest on the fixture and pick-up in the part for location.**

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

AMERICAN #2400
METAL TURNINGS CRUSHER

A chip salvage system, with an American Metal Turnings Crusher at the core, can help you realize new savings and profits in metal, oil, man-hours, factory space, and tool maintenance. Consider these typical money-saving, money-making advantages of an American installation:

(1) **Brings $3 to $4 more per ton for chips** than for long machine shop turnings,

(2) **Reclaims 30 to 50 gallons of cutting oil per ton,**

(3) **Prolongs tool life** through more liberal use of recovered oil,

(4) **Saves 75% storage space** . . . permits heavier freight car loads . . . cuts shipping costs,

(5) **Easier, faster handling,**

(6) **Easier briquetting,** so essential for foundry and steel mill use.

THIS COULD BE YOUR PROFIT STORY FOR NEXT YEAR!

240 Tons Metal Turnings Per Year.....$ 960.00 Per Year
(20 tons per month at $4 extra per ton)

3600 Gallons Cutting Oil Recovery at 30¢ Per Gallon.....$1,080.00 Per Year
(30 gallons per ton x 240 tons=7200 gallons.
Half of this, 3600 gallons, can be credited to use of chips instead of long turnings.)

Estimated Savings on Manpower, Storage, Tool Maintenance, Freight, etc......$ 300.00 Per Year

TOTAL GROSS PROFIT
(Resulting from an American Installation).....$2,340.00 Per Year

WRITE for American Rolling Ring Metal Turnings Crusher Bulletin.

American PULVERIZER COMPANY
Originators and Manufacturers of Ring Crushers and Pulverizers
1523 MACKLIND AVE.
ST. LOUIS 10, MO.

six other authors, one from each of the military services, three from industry, and one other from Purdue. They have done a comprehensive job, aimed at coordinating and explaining available material rather than tilling new ground. Plenty of references are provided in bibliographies after each chapter, if you want to do some of your own digging.

•

STAUCHEN UND PRESSEN (UPSETTING AND PRESSING—*By J Billingmann. Published by Hanser Verlag, Munich, Germany. 574 pages, 5½x8¼. Price 28.50 German Marks.*

This is an excellent treatise on mass production of small and medium-sized objects by plastic deformation. It contains a large collection of data; many are from the author's experience.

Chapter I deals with incoming material, such as wire and bar from 0.025-in. to ⅞-in. dia for cold deformation. Information is given on scrap losses from bar ends, flash, furnace loss, and manufacturing contingencies. Details are given on composition and physical properties of ferrous and non-ferrous metals for cold and hot forming. Preparation of incoming material by annealing and pickling is described, also methods of testing for deformability, surface blemishes and decarburization.

Chapter II explains the fundamentals of plastic deformation; flow of metal, work hardening, effect of die friction and resistance to deformation.

Chapter III describes and illustrates processes and machines, from the old-fashioned screw press to the most modern machine; upsetters, presses and thread-rolling machines.

Chapter IV deals with heating in furnaces and by electrical energy (resistance and induction). Scale-formation and its prevention by lithium-vapor is presented in detail.

Chapter V deals with dies and punches. It discusses mechanical and thermal stresses, heat cracks, die steels, die making, annealing hardening, tempering, polishing, nitriding, and chromium plating. Many practical hints are offered on installation and preheating of dies and on ejection of forged pieces.

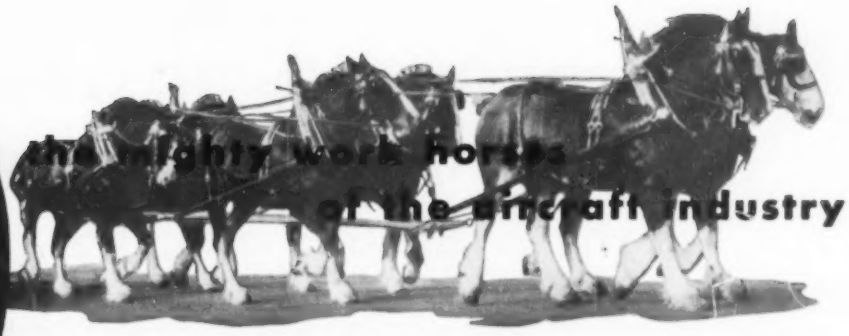
Chapter VI offers interesting examples of objects produced by plastic deformation, and illustrates the consecutive steps in production. Limitations are given for production by plastic deformation only.

Chapter VII deals with imperfec-

for high speed nonferrous metal milling

Onsrud

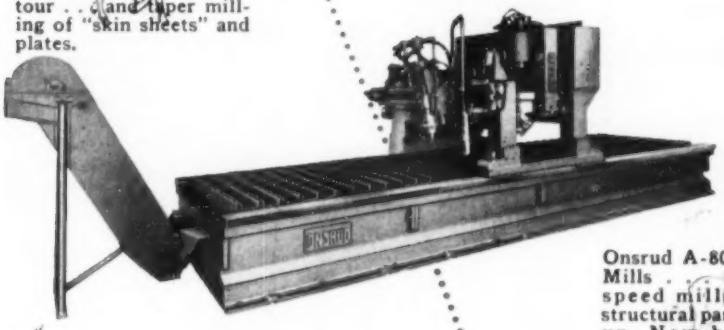
HI-FEED HI-SPEED MACHINES



the mighty work horses of the aircraft industry

Not "imagineering" hopes of the future, but actual heavy duty, super-high-speed milling machines . . . performing the tough, rough jobs that demand endurance and stamina twenty-four hours a day. Such are the Onsrud machines that are helping to build the jets and prototypes of America's aircraft industry. Designed for the milling of aluminum and related metals, these Onsrud machines mill everything from small precision parts to the huge structural plate members of wings and fuselage . . . removing colossal quantities of metal at fantastic production speeds. Onsrud machine design principles, now proved by almost twenty years of application are the key to the fastest production in nonferrous milling . . . for the aircraft industry, and all other fields of nonferrous metalworking. Typical Onsrud machines are shown here.

Onsrud A-72 InvOmil . . . the most unusual machine in metalworking! Reduces from hours to minutes, profile milling jobs with irregular contour . . . and taper milling of "skin sheets" and plates.



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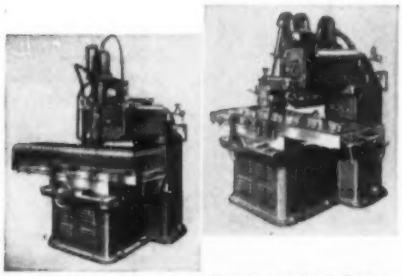
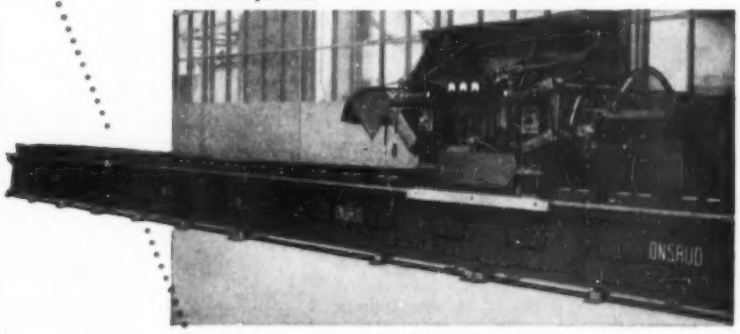


Onsrud A-24 Milling Machines . . . for general milling of all types of parts. Horizontal head permits "rise and fall" milling under profile bar control.



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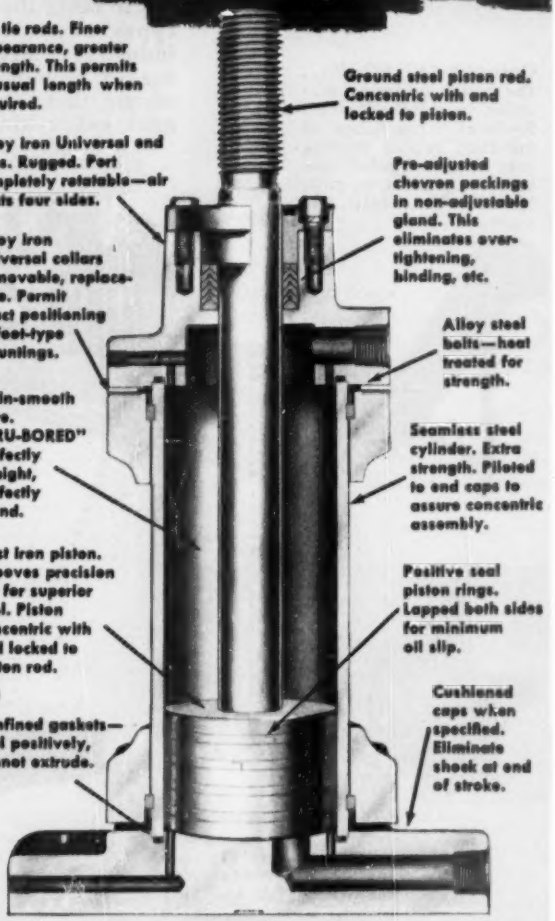
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tions in the finished product, such as cracks and surface blemishes, and with the means for preventing them. Quality control is discussed in detail.

Chapter VIII describes the final finishing treatment of the forgings, which consists of annealing, heat-treating, carburizing, nitriding, scale removal, and coating with metallic and nonmetallic materials. Corrosion-resisting packaging is also described.

Chapter IX compares the economics of upsetting and pressing with other processes, mainly machining. Chapter X is a complete bibliography and includes many references to publications by Usayan (American) authors. Chapter XI is a list of patents and patent applications pertaining to upsetting and pressing.

Throughout the book comparisons are made between the production of our machines and of German machines. In almost all cases, our machines exceed in production. In spite of this, American manufacturers will find many valuable suggestions and hints in Billingmann's book.

Reviewed by W Trinks

•

SIMPLE BLUEPRINT READING WITH SPECIAL REFERENCE TO WELDING —*Published by The Lincoln Electric Co, Cleveland 17, Ohio. 207 pages, 5½x8½ in. Price $1 in USA, $1.50 elsewhere.*

There are many books available on blueprint reading, and the subject is treated at some length in many engineering textbooks. But Lincoln has rendered another service to the welding industry by producing this volume intended specifically for welders and draftsmen of welded products—a field that has been somewhat neglected.

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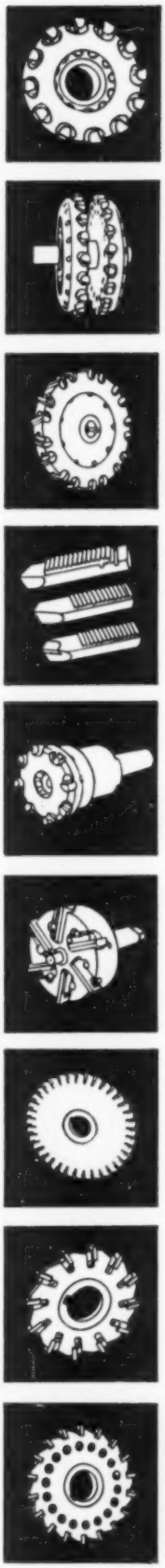
Starting on page 80, there are a hundred pages of line drawings of various objects, and the suggestion is made that each drawing be studied. Then the reader is invited to sketch a picture of the object and compare it with the line sketch and photograph on the following page. The final pages are devoted to structural, tank, and pipe drawings, and to a general quiz on the contents of the volume.



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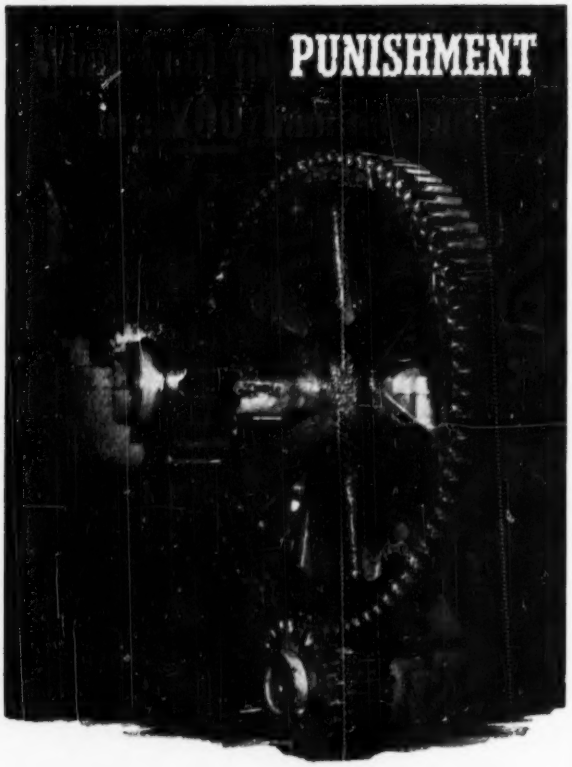

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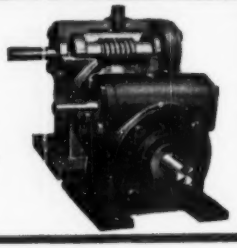

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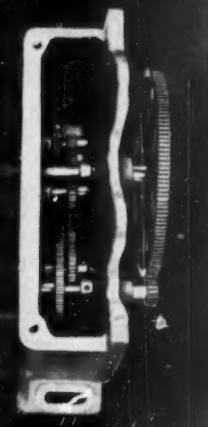

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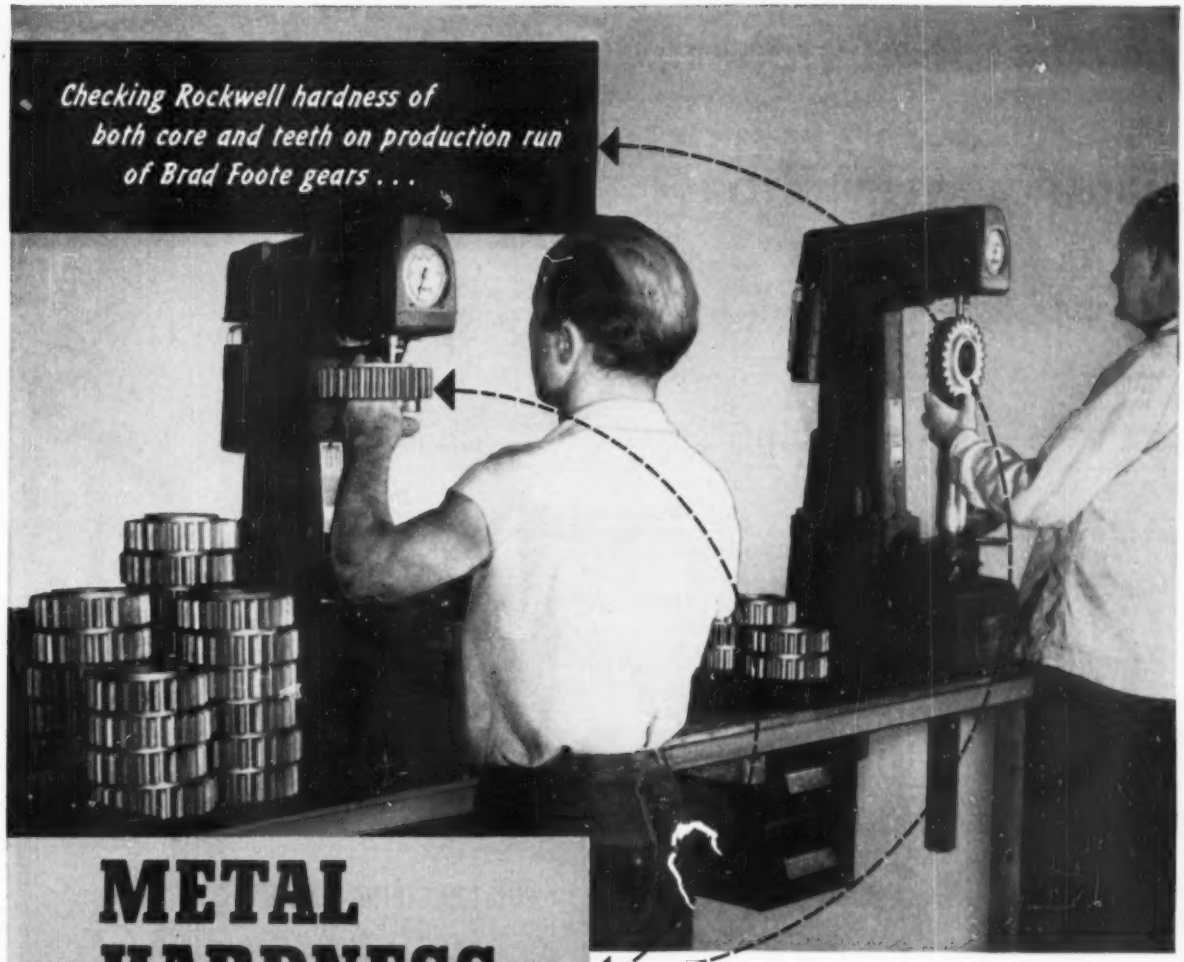

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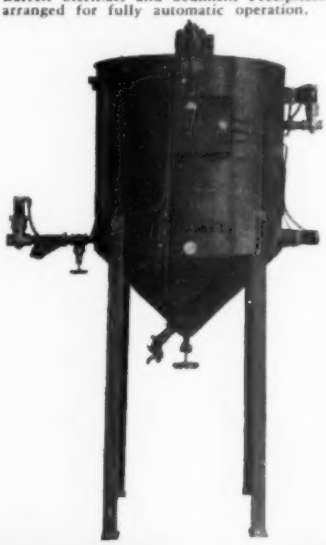

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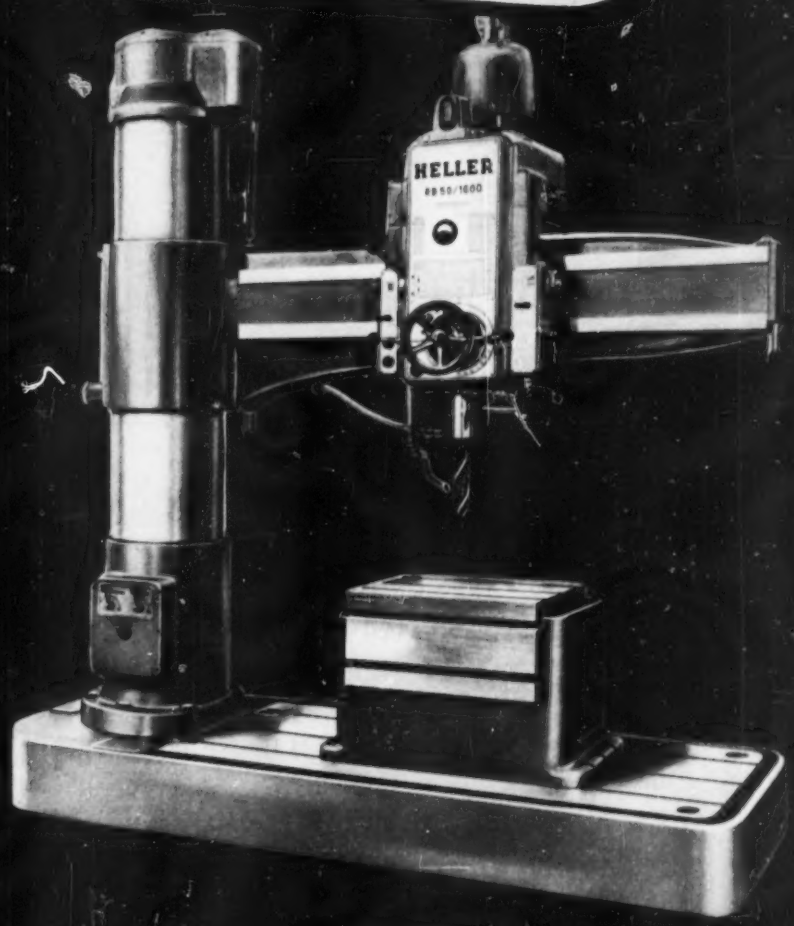

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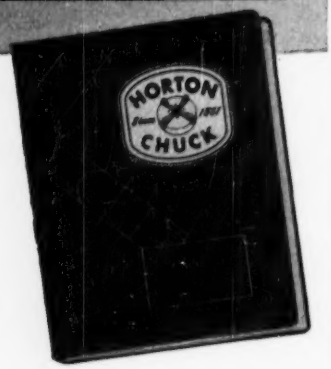

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5	30-32-36-48-80
6	36-40-48-56-80
7	32-40
8	24-30-36-38-40-44-48
9	24-28-32-40
10	28-30-36-40-48-64
12	20-28-32-36
14	20-24-28
1/16	60-64
5/64	72
3/32	48
7/64	48-56
1/8	32-40
5/32	32-36-48
9/64	36-40
11/64	36
3/16	20-24-32
13/64	32
7/32	24-28-32
1/4	18-24-26-27-30-32-36-40
5/16	16-20-22-27-28-32-40

SIZE	THREAD
3/8	12-16-18-20-27-28-32-36-40-48
7/16	12-16-18-22-24-27-28-30-32-36-40
1/2	12-14-16-18-22-24-26-27-28-30-32-40
9/16	16-20-24-27-28-30-32-40-48
5/8	12-14-16-20-24-27-28-32-36-40
11/16	11-16-18-20-24-27-28-30-32
3/4	9-11-12-14-16-18-20-24-26-27-28-32
13/16	10-14-18-20-32
7/8	10-12-16-18-20-24-27-28-32
15/16	8-9-10-12-14-16-18-20-24-32
1	10-12-16-18-20-24-27-32-40
1-1/16	12-14-16-18-20-24
1-1/8	8-10-14-16-18-20-24-32
1-3/16	8-10-12-14-16-18-20-24
1-1/4	8-10-14-16-18-20-24-32
1-5/16	12-14-16-18-20-24-32
1 3/8	8-10-14-16-18-20-24
1-7/16	8-10-12-16-18-20-24
1-1/2	8-10-14-16-18-20-24-28
1-9/16	18-20-24
1-5/8	5-1/2 - 8-10-12-13-16-18-20-24
1-11/16	10-12-14-16-18-20-24

SIZE	THREAD
1-3/4	8-10-12-14-16-18-20-24
1-3/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20-24
1-15/16	8-10-12-14-16-18-20-24-48
2	4-1/2-8-10-12-16-18-20
2-1/16	12-14
2-1/8	12-16-20
2-3/16	12-16
2-1/4	4-1/2 - 8-12-14-16-18
2-5/16	12-18
2-3/8	12-16-18
2-1/2	8-16-12
2-9/16	18
2-5/8	12-16-20
2-3/4	16
2-7/8	8-12-16
3	8-16
3-1/4	8-12-16
3-1/2	8-12-16
3-7/8	6
4	8-12

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1	56-64-72
2	56-64
3	56
4	32-36-48-48
5	40-44
6	32-36-48
8	32-36-48
10	24-30-32-48
12	24-28-32
1/4	20-28-32
5/16	18-20-24-28-32

SIZE	THREAD
3/8	16-24-32
7/16	14-20-28
1/2	12-13-20-28
9/16	12-18-20-24
5/8	11-12-18-20-24
11/16	11-16 24
3/4	10-16-18-20
13/16	16
7/8	9-12-14-18-20
1	8-12-14-16-18-20
1-1/8	7-12
1-1/4	7-12-16-18

SIZE	THREAD
1-3/8	6-8-10-12-16-18-20-24
1-7/16	8-10-12-14-16-18-20
1-1/2	6-8-10-12-16-18-20
1-9/16	8-10-12-16-18-20
1-5/8	8-10-12-14-16-18-20
1 11/16	8-10-12-14-16-18-20
1-3/4	8-10-12-14-16-18-20
1-13/16	8-10-12-14-16-18-20
1-7/8	8-10-12-14-16-18-20
1-15/16	8-10-12-14-16-18-20
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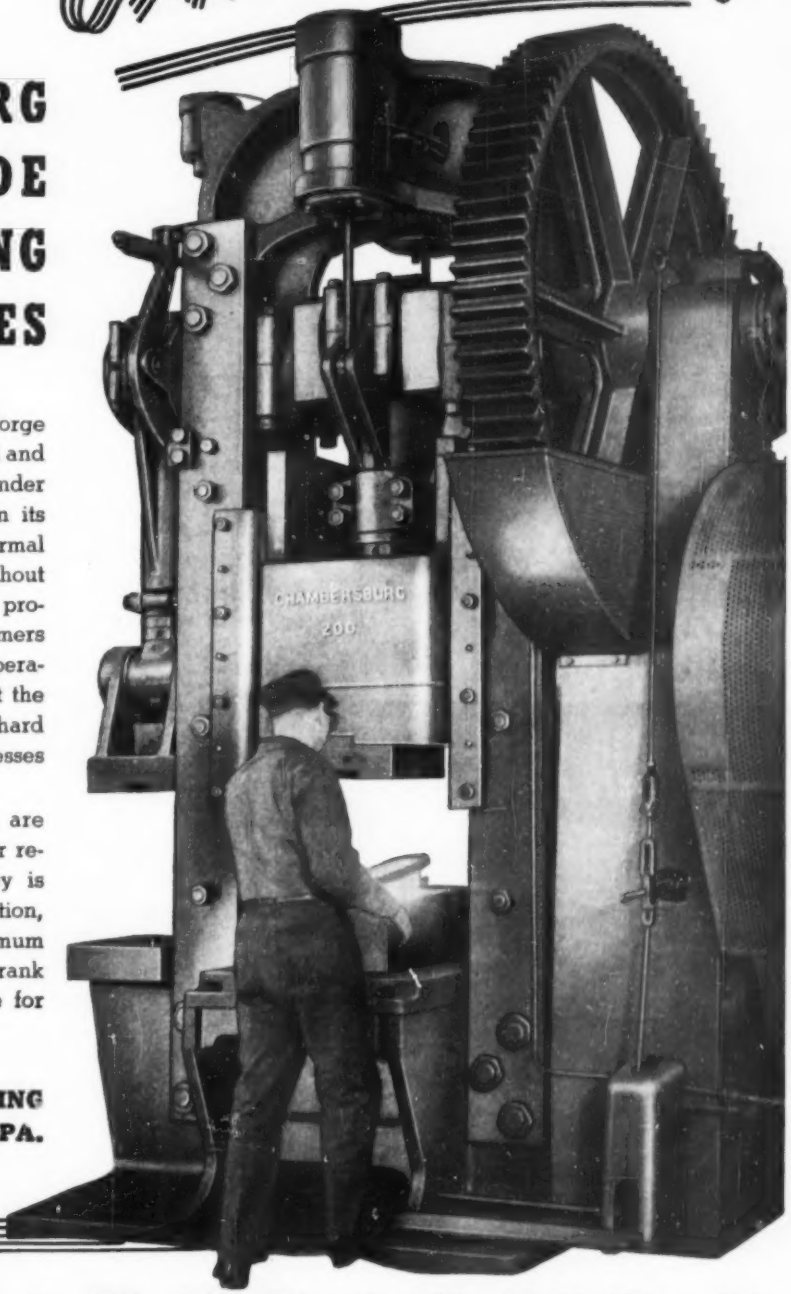

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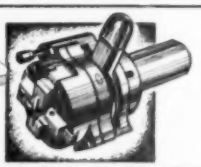

famous for accuracy and straightness of threads, low chaser costs, less down-time, more pieces per day.

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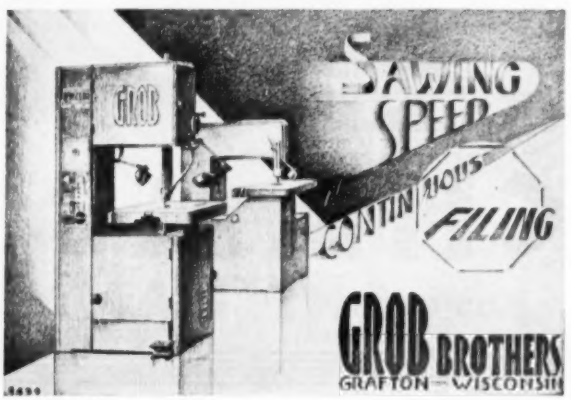
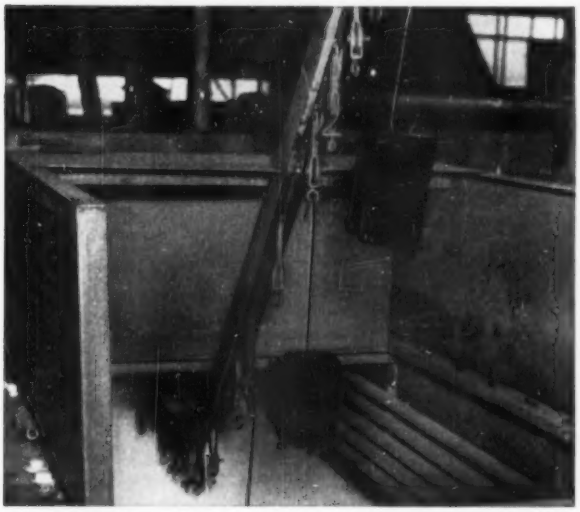
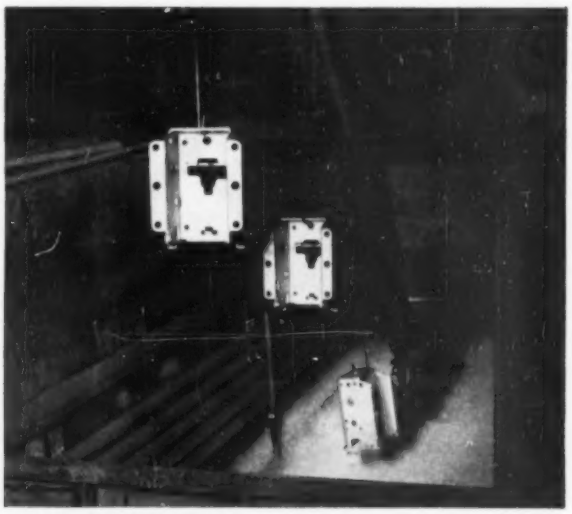


THE MODERN SOLVENT THAT FITS EVERY VAPOR DEGREASING NEED



GREASE-COVERED switch gear housings enter vapor degreasing unit by conveyor. A system such as this permits smooth, even flow of housings at high production speed.



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Du Pont metal cleaning specialists are experienced in keeping degreasing installations at peak efficiency. They will be glad to assist you in all phases of your metal cleaning program. For this friendly service, simply get in touch with your nearest Du Pont district office.

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You'll find complete information on the operation and maintenance of vapor degreasing equipment in these booklets. And interesting, up-to-date case histories about degreasing units in operation throughout the metal field are presented in our publication, "MODERN METAL FINISHING." You can receive this wealth of information by checking the appropriate boxes in the coupon below and returning it to us.

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SPECIAL TOOLS • UNITS FOR MACHINE TOOLS

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Famco now offers the most complete line of air presses ever offered for continuous production use. The line consists of 28 models, bench and floor types—air or electrically controlled—with sturdy, precision construction and many exclusive design features.

Famco's frictionless, diaphragm-type cylinder, and precision-machined components are responsible for the amazing performance which assures millions of trouble-free strokes. With Famco Air Presses you are completely free from the maintenance problems of faulty piston rings, leakage, exploded cylinders, etc.

Illustrated (right) is the foot electric control type air press with floor stand.

SPECIAL FEATURES INCLUDE:

- **Extra-long strokes infinitely variable from 0 to maximum.**
- **Semi-steel cast frame and cylinder mount; use of alloy-steel, copper tubing and steel fittings throughout.**
- **Frictionless (leak-proof), longer-lived cylinder requires no lubrication.**
- **Accurate, built-in pressure gauge.**
- **Ram keyed to prevent rotating.**
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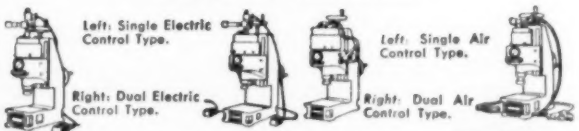
OTHER MODELS AVAILABLE WITH CHOICE OF CONTROLS


Left: Single Electric Control Type.
Right: Dual Electric Control Type.
Left: Single Air Control Type.
Right: Dual Air Control Type.

Famco Air Presses are part of the famous Famco team of Cost Cutting Machines. They are sold by leading Distributors throughout the World. See yours for further details.

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Capacity, 3000 lbs. (24" load center) Length, only 74⅝"

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Hyster now offers, in addition to the pneumatic-tired 4000-lb. YT-40 Lift Truck, a *new* lift truck in the 3000-4000-lb. class—*designed specifically for close-quarter operation!*

The new Hyster YC-40 is smaller than the pneumatic-tired YT-40 because it is *functionally* designed to more compact dimensions, utilizing smaller cushion tires. *The YC-40 is recommended for those applications where it is not necessary to use pneumatic tires.*

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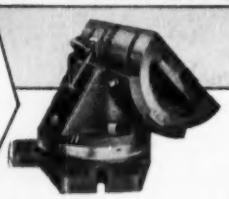

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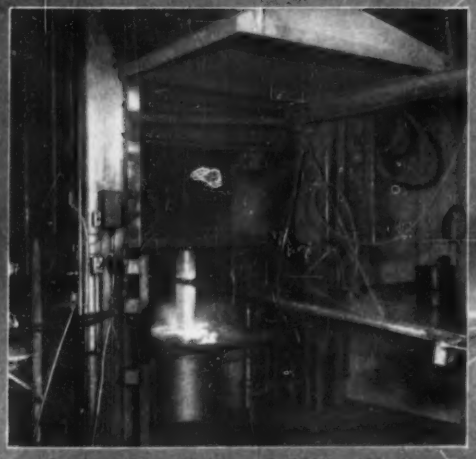
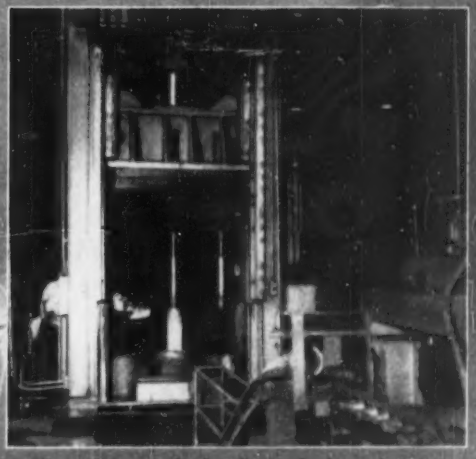


Piercing a steel billet in a 600 ton Verson hydraulic press.



Here a Verson hydraulic push through press sizes the cavity and O.D. of the steel forging.

AMONG the many advancements in the press forming of metals that have been pioneered by Verson in recent years are new, improved presses and tooling for producing artillery projectiles. Under the pressure of a combination military and civilian economy, Verson methods have resulted in substantial savings in metal and have made possible great increases in output without a corresponding increase in critical manpower.

Equally important strides have been made in civilian production, too, but tremendous opportunities for modernization and increased efficiency remain. We would like to have the opportunity to discuss press forming of metals with you and help you set up a plan that will enable you to take advantage of the many cost cutting opportunities that are becoming available.

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Hydraulic Power — 20 tons.

Tube Size Range — ½" through 2" O.D. Maximum 2" x .083 steel tubing.

Bending Clearance — 2" tube with 5" center-line radius to 180°.

CUSHIONS

Twin double-acting cylinders offset mounted on sides of press, direct connected to heavy, needle bearing crank arms of wing die holders. Three anchor positions compensate for various settings.

DIE HOLDERS

Forward-mounted, equally controlled wing-type with single screw adjustment and die recesses.

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Welded HR steel frame work, stress relieved. Incorporates oil reservoir, pump, motor, and valve-mounting units.

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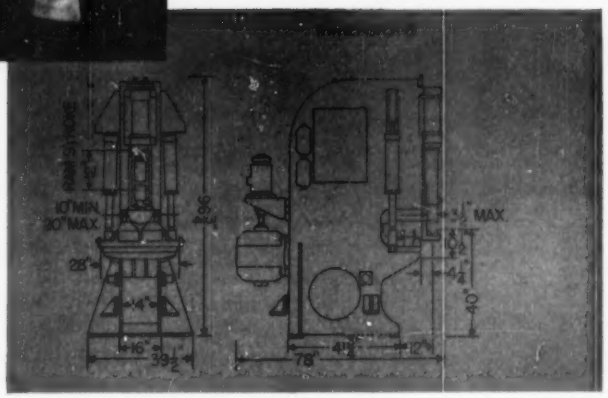
20 hp, 1200 rpm motor powers 2000 psi Vickers pump. 220-440 volt, 3-phase, 60-cylce. Control circuits on 110 volt through transformer.

New Pines 20-Ton Vertical Hydraulic Tube and Pipe Bending Press showing side-mounted twin oil coolers, panel-mounted hydraulic valves, side offset-mounted cushion, and 10-station automatic angle-of-bend selector turret. Note how design eliminating under die cushion mounting provides extra working clearance. On this setup, adjustable bars at left are used for positioning workpiece for various planes of bends.



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20-Ton Tube and Pipe BENDING PRESS

DESIGNED WITH EXTRA WORKING CLEARANCE..... SPEEDS HANDLING BROAD RANGE OF MULTIPLE BENDS IN ONE SETUP

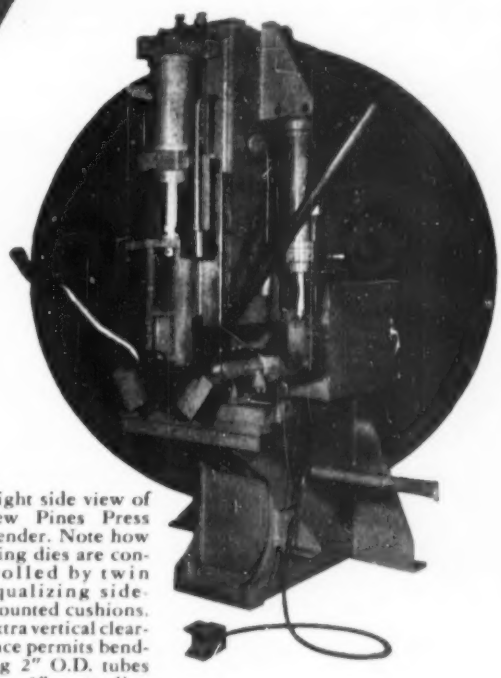
You'll find in the new Pines 20-Ton Hydraulic Press Bender a world of new production features, including those you have been wanting for a long time, that will help you substantially increase output and reduce production costs. You'll find the overall design affords greater working area on both sides and in front of the press and permits handling a much broader range of multiple bends in a single setup.

You'll like the new 10-station automatic angle-of-bend selector that eliminates cycling through idle stations, and the twin double-acting cushion cylinders on each side of the press that positively maintain a constant equalized pressure and help produce smoother, better bends without excessive flattening or distortion. Easy operating and setup features are included that save time and reduce operator fatigue.

These, and the many other outstanding Pines features listed below, will help you step up efficiency as much as 50% in handling, for example, automotive exhaust and tail pipes requiring a variety of bends in different planes, as well as the hundreds of other jobs adaptable to press benders.

OUTSTANDING FEATURES

- **Twin Equalizing Side-Mounted Cushions** — eliminate base obstructions, provide greater working clearance, maintain constant torque, reduce flattening and distortion.
- **Faster Cycling** — 10-station angle-of-bend selector indexes and resets automatically to starting position, eliminates cycling through idle stations, increases output.
- **Greater Work Handling Capacity** — extra clearance reduces number of setups on multiple bending, permits broader use of uniform radii, cuts tooling and production costs.
- **Interchangeable Pick-Off Turret** — for angle-of-bend control. Permits storing and remounting for repetitive jobs, reduces setup time, insures accurate duplication on repeat work.
- **Adjustable Ram Speed Control** — assures efficient operation, simplifies setups. Ram can be lowered slowly or stopped at any point.
- **Built-In Oil Coolers** — maintain uniform oil viscosity, assures uniform results on production runs.
- **Single-Screw Wing Die Adjustment** — eliminates problem of equalizing die settings. Adjusts both die holders simultaneously.
- **Movable Foot Control** — assures maximum convenience, reduces operator fatigue. Master safety switch on ram slide.
- **Sturdy Welded Steel Frame** — stress relieved, assures rigid die support, provides extra working clearance.
- **Compactness Conserves Floor Space** — 100-gal. oil reservoir in base, motor vertically-mounted at rear, panel-mounted valves.



Right side view of new Pines Press Bender. Note how wing dies are controlled by twin equalizing side-mounted cushions. Extra vertical clearance permits bending 2" O.D. tubes on a 5" center-line radius to 180°.

PROMPT DELIVERY — Write today for more data and prices on the new Pines High Production Bending Press. They are being lot-produced as standard units and prompt delivery can be made on early orders. They are designed and built by America's leading manufacturer of tube bending equipment.

Automatic Benders

Semi-Automatic Benders

Tube and Rod End-Finishing Machines

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Swing over table 10"
Distance between centers 20"
Surface of table 5" x 32"
4 spindle speeds, r.p.m. 2900 to 5800

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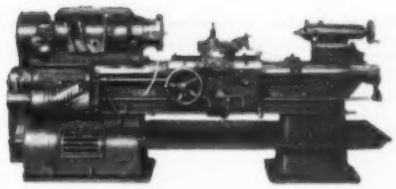
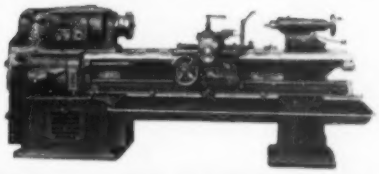
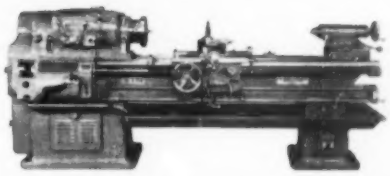


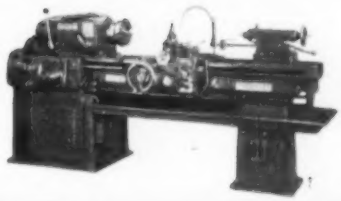
18" — 20" — 24" 12-speed Geared Head Lathes



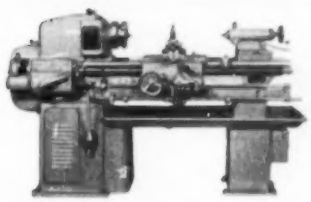
12" — 14" — 16" 18-speed Geared Head Lathes



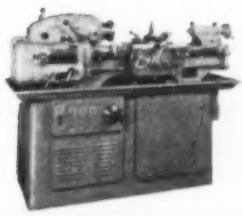
12" — 14" — 16" 12-speed Geared Head Lathes



No. 2 General Purpose Lathe



No. 1 General Purpose Lathe



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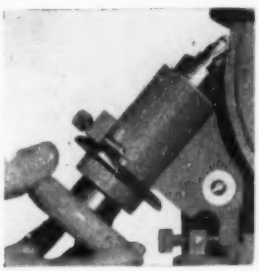

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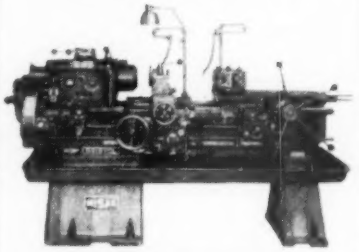

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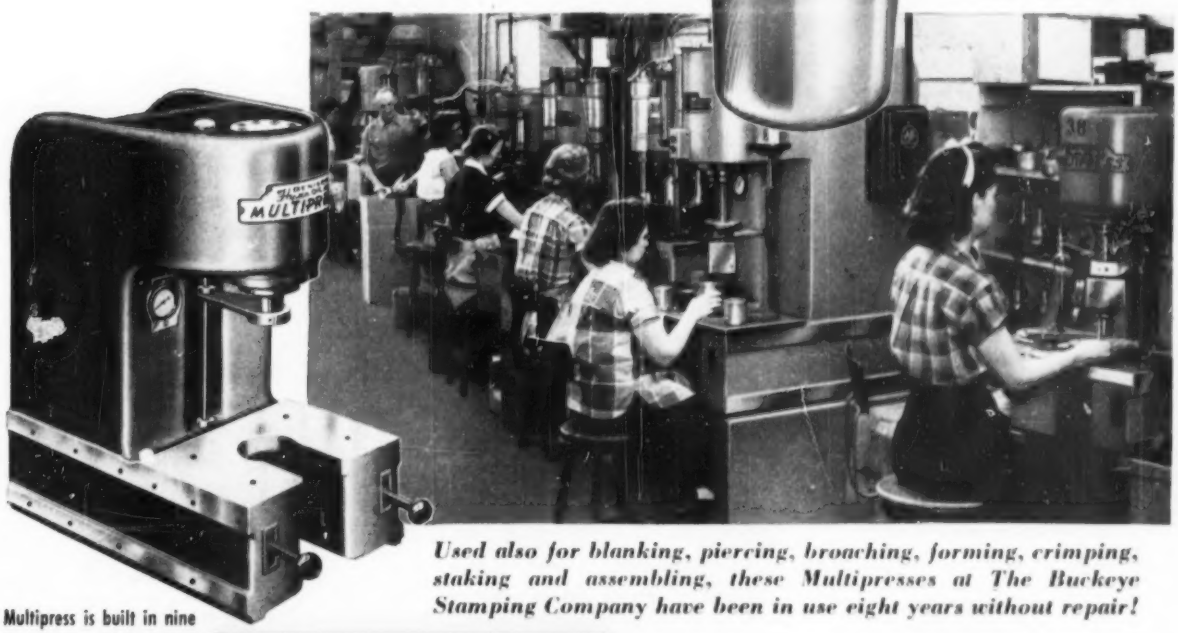

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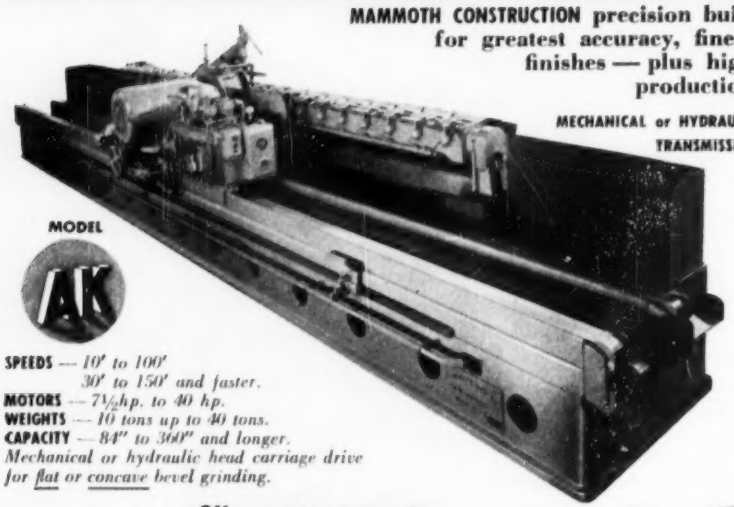

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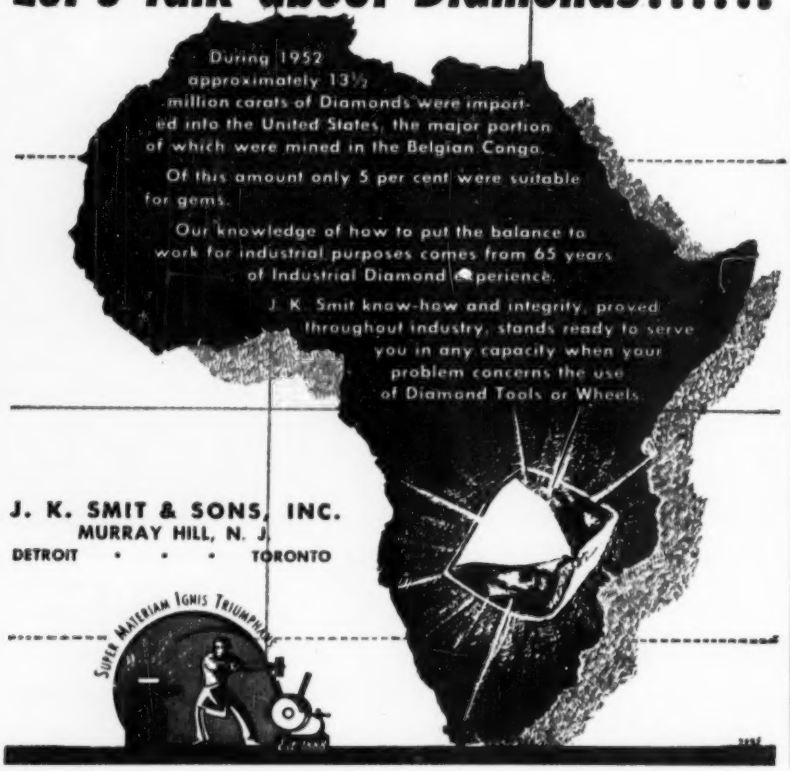
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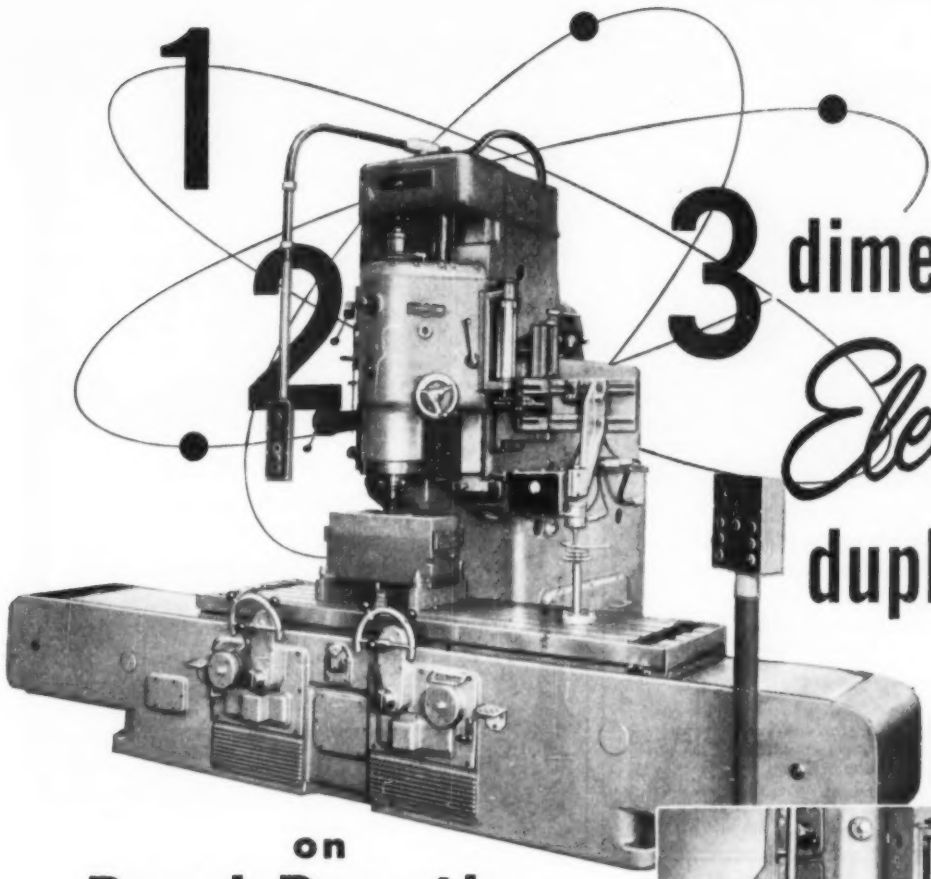

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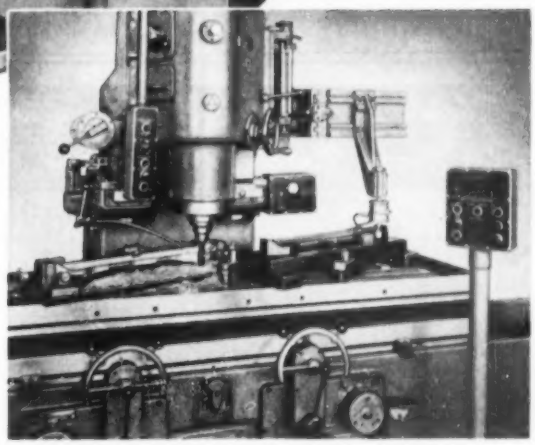

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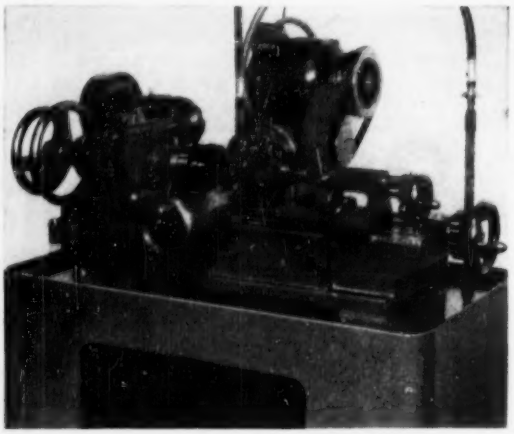

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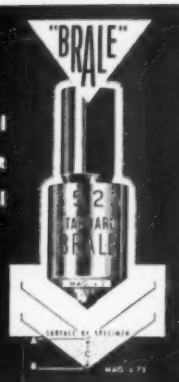

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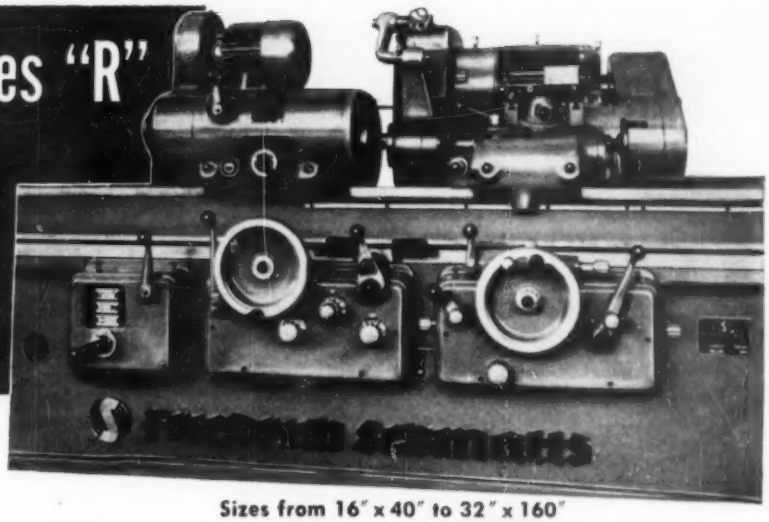

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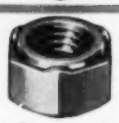

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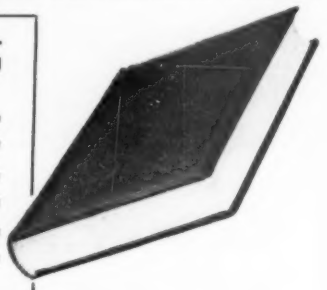

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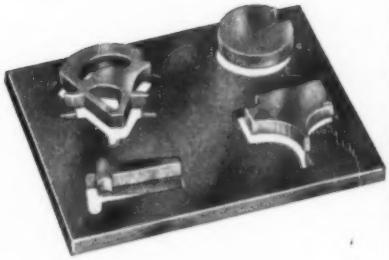

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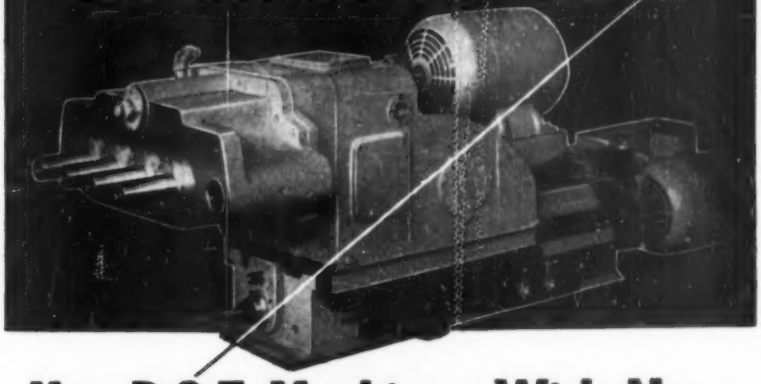
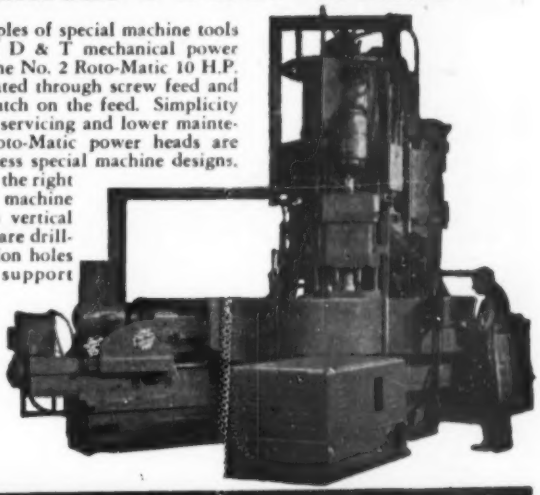


Use D&T Machines With New Mechanical Power Heads

Here are two good examples of special machine tools designed and built with D & T mechanical power heads. Shown above, is the No. 2 Roto-Matic 10 H.P. head. All sizes are operated through screw feed and have overload release clutch on the feed. Simplicity of design makes for less servicing and lower maintenance costs. D & T Roto-Matic power heads are readily adapted to countless special machine designs. For instance: Machine to the right is a 6 station indexing machine with 3 horizontal and 3 vertical power heads. Operations are drilling and reaming suspension holes and king pin holes in support arms for power heads.



Free Data

is available on the complete line of D & T machines. Ask for Bulletin 1000.

DAVIS and THOMPSON Roto-Matic

Davis & Thompson Company
6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

Gas Fired FURNACES

No Blower or Power Needed FOR TEMPERATURES TO 2400° F.

Just connect the BUZZER High Speed Muffle Furnace to your gas supply and it is ready for use. A temperature of 2400° F. is attainable in approximately 1½ hours. Special block for controlled furnace atmospheres make this furnace particularly adaptable for high carbon and alloy steels. Special BUZZER burners have wide range of control.

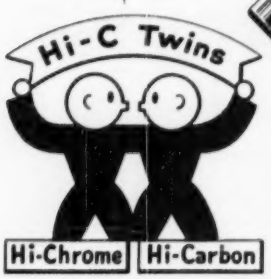
Send today for catalog showing this furnace in bench and floor models, as well as other types of furnaces, burners and other equipment.

CHARLES A. HONES, INC.
121 South Grand Avenue, Baldwin, L. I., N. Y.

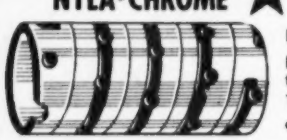
a NEW NOTE for Bushing Economy and Service!

The REVERE Pop Fit Bushing reports savings of over $100.00 per week on only 64 bushings. A yearly savings of $5,000, plus a saving on bushing change time. A customer reports that with competitive bushings they changed bushings every day; with REVERE bushings, once a week.

A CHANGE TO *Revere* IS CHANGE IN YOUR POCKET!



NYLA-CHROME ★ the Hi-C twins' little sister...



For Automotive and machinery bearings. Rust-proof; no lubricant required. Long life under the most adverse conditions.
The REVERE Chrome Bushing carrying nylon on the inner or outer surface.

Revere Fisher ENGINEERING COMPANY NORTH BRANCH MICHIGAN

★ *Star Performer In The Reamer Field*

Staples

CARBIDE-TIPPED
SHELL TYPE EXPANSION REAMER*

For maximum tool life with minimum tool servicing, put this Staples Shell Type Expansion Reamer do the job. Tool is returned to original diameter simply by driving the shell up the tapered arbor. Tool can be expanded many times without a re-grind. To obtain a new tool, just order a new shell—a standard stock item.

Standardize on Staples Carbide-Tipped Circular Cutting Tools. You'll get longer tool life—greater accuracy—finer hole finish—and spend less time on tool servicing. Staples is the *quality* name in carbide tool production. You'll save money in the *long* run with Staples.

*Patented.

THE STAPLES TOOL COMPANY, Cincinnati 25, Ohio
Distributors in Major Cities
Staples CARBIDE-TIPPED CUTTING TOOLS
A complete line of Circular Carbide Tipped Cutting Tools
Expansion Reamers · Special Tools

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• HAND • SEMI-AUTOMATIC • AUTOMATIC
Special Machinery

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Engineering Service on Your Metal Forming Problems

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The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

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Plant Superintendent—$12,000 to $15,000

Small plant (340 Empl) heavy machining, assembly and welding. Proven background as machinist and supervisor—Age 35 to 48.

CONTACT RAY EDWARDS
O'SHEA EMPLOYMENT SYSTEM
"America's Largest"
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Executive Engineers 8 to 15,000. Designers—all kinds to 12,000. Tool Designers—Engineers 6 to 12,000. Detailer. Draftsmen and Trainers—Highest Pay—FREE. Employers pay our fees on the above. We also place all types of manufacturing executives, office and sales executives.

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REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

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MAN WANTED to cover Industrial Accounts for well-known established Electrical Wholesaler located in Brooklyn. Part time or full time. Must have active accounts. Electrical experience not necessary. Drawing and expenses against commission. RW-7231, American Machinist.

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MR. MANUFACTURER: If you manufacture drilling and tapping equipment or allied lines and are looking for a real live-wire representative specializing in the above field, to cover industrial Chicago and surrounding territories. Write RA-7569, American Machinist.

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A Live and long established light and medium engineering company in England with modern factory and plant and excellent sales organization, would be prepared to consider the manufacture of machines on royalty or similar basis. Efficient marketing facilities available in England and Europe. BO-7633, American Machinist.

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Available

A manufacturer of a machine tool is retiring, and is soliciting inquiries on this plant.

It is centrally located and has an ample backlog of orders.

Please send inquiries to

BO-7619,
American Machinist
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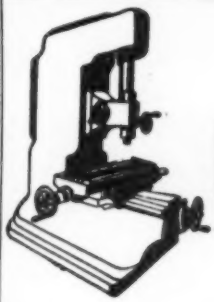
Chicago 11, Ill.



SEARCHLIGHT Equipment Spotting SERVICE

This service is aimed at helping you, the reader of AMERICAN MACHINIST, locate used and surplus new metalworking machinery and equipment not currently advertised. (This service is for user-buyers only.)

Just send in the specifications of the equipment wanted on the coupon below, or on your own company letterhead, to

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., N.Y. 36, N.Y.

Your requirements will be brought promptly to the attention of the used equipment dealers advertising in this issue. You will receive replies directly from them.

NO CHARGE • NO OBLIGATION

Searchlight Equipment Spotting Service
c/o American Machinist
330 W. 42nd St., New York 36, N. Y.

Please help us locate the following used equipment:

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COMPANY .....

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4/27/53

QUALITY PLANERS—STOCK DELIVERY!

DETRICK & HARVEY 48"x48"x16' 4 heads; hydraulic table feed and clapper box lifts.

GRAY 36"x36"x10' double housing—"Maximum Service"; 4 heads, rapid traverse; box table.

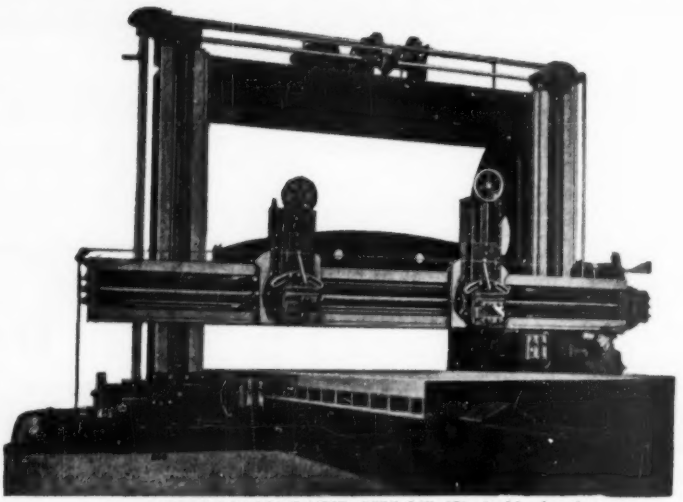
LIBERTY 144"x76"x48' adj. Convertible open-side; 4 heads; rapid traverse.

NILES 48"x48"x10' double housing "Time-Saver" 4 heads; box table; rapid traverse.

NILES BEMENT POND 60"x60"x12' double housing; 3 heads; box table; rapid traverse.

NILES BEMENT POND 72"x72"x30' double housing; 4 heads; box table; rapid traverse.

NILES BEMENT POND 108"x84"x42' double housing; 4 heads; box table; rapid traverse.



BETTS-CONSOLIDATED 108"x84"x42' double housing Planer—4 heads; box table; rapid traverse.

WIRE, PHONE or WRITE

Ask for catalog of

AMERICA'S FINEST STOCK

MOREY ...for machine tools!

MOREY MACHINERY CO., Inc.

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Manufacturer has some available time for straight cut beveled gear work running from 1½" to 20", depending upon ratio, 4 pitch to 24 pitch. Equipped to handle coniflex or straight bevel tooth if required.

SIER-BATH GEAR & PUMP CO., INC.
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THREAD & WORM GRINDING

Capacity available on J&L Thread Grinders. Maximum length between centers 52". Maximum threaded length (1 pass) 22". Maximum swing 21". Also, Thread Grinders rebuilt.

Prompt quotations on request

GROUND THREAD ENGINEERING CO.

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DID YOU SEE OUR FULL PAGE AD IN LAST ISSUE?

JOSEPH BEHR & SONS

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SEVERAL 20 x 96" MATTISON SURFACE GRINDERS

Available for Job Work

On grinding of steel flat shapes. Particularly interested in large runs where customer furnishes raw or partially finished material, where grinding only, is required.

CW-7078, AMERICAN MACHINIST
330 W. 42 St., New York 36, N. Y.

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LARGE LATHE WORK up to 80" Dia.

EISLER ENGINEERING CO., INC.
738 So. 13th St., Newark 3, N. J.

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NILES-BEMENT-POND

Table 60" wide, 20 ft. long, 36" high from table to cross rail. Direct motor drive—DC current through AC-DC Motor Generator Set. May be seen operating on either day shift or early evening night shift. $9750.00

NEW ERA MANUFACTURING COMPANY
375 Eleventh Ave., Paterson, New Jersey
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We Pay Liberal Commissions For All Leads On Contacts Pertaining To

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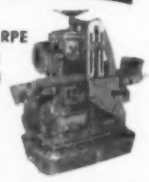
Processing or special machine design. We are an established firm doing work for many nationally known Corporations.

ENGINEERING SERVICE CO.
415 No. Dearborn St., WH 3-0823, Chicago 10, Ill.

MACHINE TOOLS



BROWN & SHARPE No. 12 PLAIN PRODUCTION MILL

WRITE TODAY

LINCOLN MACHINERY
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PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them

GENERAL PATTERN WORKS
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MACHINERY WANTED

Highest prices paid for late type machine tools.
Write – wire – phone

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BUY FROM STOCK
Telephone
BAKER 5887

FALK
MACHINERY COMPANY

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N. Y.

Every Item Guaranteed as Represented

AUTOMATIC, #90G Brown & Sharpe, M.D.
AUTOMATIC #9 B & S Wire Feed Screw, Late.
AUTOMATIC, Cleveland Model #B-1½" Spl. Spdl.
AUTOMATIC #2 B & S Wire Feed, 1" screw, Late.

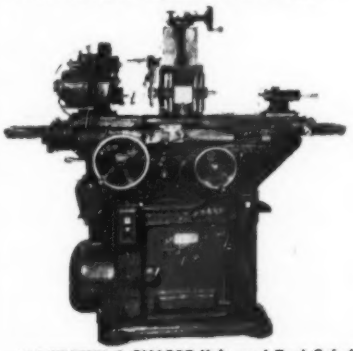
BALANCER, Anderson Bros. 14"x84", Rote-Checker.
BORING MILL, 24" Bullard M.D., V.T.L.
BORING MILL, 36" Bullard M.D., V.T.L.
BORING MILL, 36"x44" Niles Vert. M.D., Side Head.
BORING MILL, 2¼" Lucas Horiz., M.D.
BORING MILL, Lucas Horiz. 3" Bar, M.D.
BORING MILL, Giddings & L #9 Horiz. 3½" Bar.
BARRELS, Tumbling Lupomatic, Schutte & Koetring.
BRAKE, #335 Chicago, M.D., Press, 6' 14 ga., NEW.
BRAKE, #188 Chicago Power Apron, 8'x3/16" cap.
BROACH, #3 LaPointe Horiz. 50" Str. M.D.

COMPRESSOR, Ingersoll Rand ER-1, 10 HP, M.D.
COMP., 15 HP, 10 HP, Gardner Denver, M.D., New.
COMPRESSOR, C-P 50 HP, M.D., 10x10, 278 CFM.
COMPRESSOR, Ing.-Rand ER-1, 100 HP Syn. M.D.
CRANE, DET Ricker 2 tons 11'9" span.
CRANE, Canton #8 Portable Gooseneck 3 ton cap.
CHIP WRINGER, 28" Tolhurst M.D., Late.
GAS CUTTER, Airco #4 & #18 DB Radiagraph.

RADIAL DRILL, 3' 9" Mueller, M.D.
RADIAL DRILL, 4'x11" American, M.D.
RADIAL DRILL, 5'13" Cincinnati-Bickford, M.D.
RADIAL DRILL, 6'x15' Cincinnati-Bickford, M.D.
RADIAL DRILL, 30" Walker Turner M.D., Late.
DRILL, Foodick 19", S.S. Power Feed, M.D.
DRILL, #2 Colburn H.D., #4 M.T., M.D.
DRILL, #121 Baker Auto. S.S. Cam Operated.
DRILL, Deep Hole, Avey-Drumlic #2, M.D.
DRILL, Edlund #2B, 3 spdle. #2 M.T., 16".
DRILL, 4 & 6 Sp. Avey 12" overhang, #3 M.T., M.D.
DRILL, 4 Sp. Barnes H.D., M.D. #4 M.T., P.F.
DRILL, Cincinnati 21" with Tapping Attach. M.D.
DRILL, Natco Multiple Spdle. #12, #1 M.T., M.D.
DRILL PRESSES, Leland Gifford #1MS, 1, 2, 3, 4.
DRILL PRESS, #2MS Buffalo Forge single spindle.
DRILL, Barnes, 24" S.S. #4 M.T., 1¾" cap.
DRILL PRESS, #25 Foote-Burt S.S. 24", #5 M.T.
DRILLS, #14, #15, #16, #18 Buffalo Forge, M.D.
DEEPFREEZE Motor Products 40 below zero.
DEMAGNETIZER, SB-811 Magnaflux, late type.

FACING HEADS, 20" & 24" Mummert-Dixon.
FILER, #11-B Cochrane Sty Auto Saw Filer.
FILER, Type P4, Oliver Floor Type, M.D.
FURNACE, Westinghouse Elec. 18 KW, 2100° F. cap.

FURNACE, Machler Steam Oven, Serial #3543.
GRINDER, M.D. Sanford Surf. 8"x12" cap., New.
GRINDER, #1 Wilmarth Norman Hand Surf., 6"x12".
GRINDER, #2 Imperial Univ. Tool & Cutter, New.
GRINDER, #2 Brown & Sharpe Sur. 6"x18" cap., M.D.
GRINDER, #4 G & L Univ. Tool & Cutter, M.D.
GRINDER, Diss, Easly #2005, 16" Dble End.
GRINDER, Heald Rotary #25, M.D. 16" Cap.
GRINDER, Cylindrical, Norton 10"x24", M.D.
GRINDER, Brown & Sharpe #4 Univ. 12"x60".
GRINDER, #13 B. & S. Univ. Tool & Cutter.
GRINDER, Thread, Jones & Lamson #TG-615, Late.
GRINDER, Thread Jones & Lamson #TG840, Late.
GRINDER, Heald #72A-3 Internal Size-Matic.
GRINDER, 14"x36" Pratt & Whitney Vert. Surf.
GRINDER, Pratt & Whitney 22"x84" Vert. Surface.
GRINDER, Greenfield #12 Int. Hydromatic, M.D.
GRINDER, Oliver Auto. M.D. Drillpointer, #510.
GRINDER, #33 Abrasive Vert. Auto. Surface, M.D.
GRINDER, #22 Heald Horiz. Rotary Surface, M.D.
GRINDER, Diamond Snagging 10 HP, 24"x4½".
GRINDER, Norton 6x18 Vert. Surface, Hyd. Late.
GRINDER, #60 & #70 Heald Internal.
GRINDER, Landis 6"x18" Hyd. Cyl. late type, M.D.
GRINDER, Sellers Type #1A Tool, 24" wheel.
GRINDER, 37" Wheel Dia. Ostarheim Diss. 24" cap.
GRINDER, 30" Ingersoll Tub Face Mill, M.D.
GRINDER #79-72" Gardner Vert. Spindle, Late.



#13 BROWN & SHARPE Universal Tool Grinder, Motor Driven.

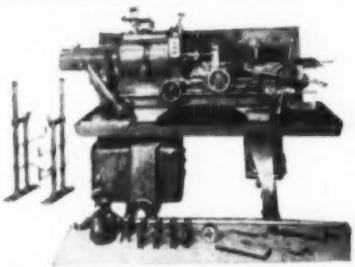
GRINDER, #214—30" Besly Double End Disc, Late.
PROFILE GRINDER, Studer Type PSM, M.D., late.
GEAR SHAPER, Fellows #6 High Speed, M.D.
GEAR SHAPER, Fellows #7 High Speed, M.D.

HAMMER, Rochester Hispeed, all sizes, M.D.
HAMMER, Bradley 200# Rubber Cushioned Helve.
HEADER, Manville #1 S.S.D.D. Cold 3/16".
INDUCTION HEATER, 15 KVA Ecco Hi Frequency.
INDUCTION HEATER, 30 KW Lepel, Late Type.
AIR MOTOR HOIST, Ingersoll Rand 2000# cap.
ELECTRIC HOISTS, 500-4000 lbs. Whiting, NEW.
HONE, #194 Barnes Vertical, M.D., Hyd. Late.

KEYSEATER, #5 Mitts & Merrill, Giant, M.D.
LAPPER, 2F Norton Vert., M.D., late type.

No. 7 BARDONS & OLIVER Geared Head

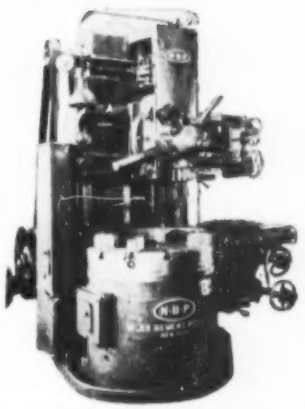
Full Universal Turret Lathe, Preselector Head, Bar Feed, 4" capacity through spindle. Late Type, Motor Driven.



#2 WARNER & SWASEY Geared Head Turret Lathe, 12 Spindle Speeds, Bar Feed.

LATHE, Lo-Swing 8"x108", M.D., A.C. Rebuilt.
LATHE, Porter-Cable 9'x15" Geared Head Prod.
LATHE, 12" Reid Smallpiece Production, Late Type.
LATHE, Hendey 12"x5' Q.C.G. Taper Attach. M.D.
LATHE, LeBlond 14"x6', Q.C.G. M.D.
LATHE, Hendey 14"x8' Q.C.G. Taper Attach. M.D.
LATHE, American 18"x6' Q.C.G., Grd. Hd. M.D.
LATHE, Lehman 16"x7' Q.C.G., M.D.
LATHE, American 18"x10' Q.C.G., Grd. Hd.
LATHE, South Bend 18/28"x8' Gap Bed, Q.C.G. M.D.
LATHE, Reed-Prentice 20"x10' Grd. Hd. M.D.
LATHE, LeBlond 22"x10' Q.C.G., M.D.
LATHE, 24"x12' Boye & Emmes Gd. Hd., T.A., Late.
LATHE, Putnam 23/32"x12' Q.C.G., M.D.
LATHE, LeBlond 24"x14' Q.C.G., Grd. Hd.
LATHE, Lodge & Shipley 28"x14', Q.C.G., M.D.
LATHE, Bridgeford 27"x12' Geared Head, M.D.
LATHE, 27"x16' Niles Timmaver, Grd. Hd., M.D.
LATHE, Bridgeford 32"x16' Q.C.G., Grd. Hd.
LATHE, 42"x18' Pittsburgh Geared Head, M.D.
LATHE, Bulling Dble. End #VMT5, Devine Bros.
LATHE, Turret #1 Bardons & Oliver Electric Head.
LATHE, Turret, #2 Simmons Vari Drive 220 V.
LATHE, Turret #2 W & S Univ. Grd. Hd., Late.
LATHE, Turret, #4 Warner & Swasey Univ. 1½".
LATHE, Turret #4DE Potter & Johnston Auto., 1942.
LATHE, Turret #6 Warner & Swasey Grd. Hd. Ram Type, Bar Feed, Motor in base.
LATHE, Turret #7 Bardons & Oliver, 4" cap., Late.
LATHE, Turret #2 Cinci. Acme Univ. Geared Head.
LATHE, Turret, #3A Warner & Swasey Univ. M.D.
LIFT TRUCKS, Baker 1 & 2 ton, Platform & Fork.

MILL, #4 Burke Motor Driven, Late, M.D.
MILL, #2 Pratt & Whitney Prod. Duplex, M.D.
MILL, #3VB Hardinge Vert. Bench, M.D.
MILL, #4B Brown & Sharpe H.D., Horiz. M.D.
MILL, #14 Garvin Plain Horiz., M.D.
MILL, #8Y Brown & Sharpe Plain Horiz., M.D.
MILLING MACHINE, #2B K & T Horiz., M.D.
MILL, Cinci. Horiz. #3, #4, #5 High Power, M.D.
MILL, #1 Brown & Sharpe Plain Horiz., M.D.
MILL, #9-8 Cinci. Vert. Prod. Late, M.D.
MULT-MILLER, U.S. Tool #MM-1-6 Auto. Prod.
MILL, #0 Douglas Plain Horiz. M.D., Coolant.
MILL, #0 Sundstrand Rigidmil Hyd. Late Type.
MILL, #0 Vernon Hand Mill, M.D., Late.
MILL, 2A Brown & Sharpe Horiz. Univ., M.D.
MILL, #2SP Van Norman Horiz. M.D., Late.
MILLING MACHINE, Kempsmith #2 Horiz. Univ.
MILL, #3 Cinc. Univ. Horiz., M.D.
MILLING MACHINE, LeBlond #4 Horiz. Univ.
MILL, #2 Vert. M.D. Brown & Sharpe.
MILL, #3 Cinci. Vertical Hi Power, M.D.
MILL, #5C Becker Vert. Die Sinker, M.D.
MILLING MACHINE, #2 Van Norman Duplex, M.D.
MOTOR GENERATOR SET, Gen. Electric, 100 K.W.



36" x 44" Niles Vertical Boring Mill, Side Head, Motor Driven.

THREADING, Staybolt Lassiter Millholland 1½".
THREAD MILL, 7½x11 Hanson-Whitney, Univ.
THREAD MILL, 6x14 Pratt & Whitney No. 1185.
THREAD MILLER, Lees-Bradner #40A Automatic.
THREAD MILLER, Plan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, Late.

PLANER, Cincinnati 30"x30"x12' A.C., M.D.
POWER PRESS, Bliss #164 Open Back, M.D.
POWER PRESS, Bliss #3A S.S. Dble. Crank Grd. 45 tons, 4" stroke, 36"x20" Bed Area, M.D.
POWER PRESS—Bliss-Consolidated #163-B Straight Side Dble. Crank 45 tons, M.D.
PRESS, #5 Johnson OBI, 90 tons, new.
PRESS, #7 & #8 Johnson OBI 75 & 90 tons, New.
PRESS #183 Toledo Toggle Drawing, M.D.
PRESS, 135 Ton Clearing Single Crank 8" Str., Late.
PRESS, 70H Drake Hyd. Arber, New.
PRES. 75½ Bliss S.S. 9½ Str. M.D.
PRESS, Federal #2 O.B.I. Grd. 2" Stro.
PRES. Bliss #18, #19, #28, #21, OBI, A.C., M.D.
PRES. Waterbury-Farrel High Speed 60 tons #3W.
PRESS, 68 C Bliss Double Action, 3 crank.
PRESS, Lucas 15 tons Power Arbor, M.D.
PRESS, #68 Whitney Deep Thr. 24", foot.
PRESS, P2, P3 Ferracute M.D. Roll feed.
PANTOGRAPH, #1A Gorton M.D. Engraving.
PUNCH, #48 Buffalo Forge Vert. Cap. 1"x1½" M.D.
PUNCH, R-4 Wiedemann Turret, 10 Stat. 24" thr.
PUNCH, Hecker Turret, 8 station, cap. 2½" hole.
PUNCH, H & J #2 Sgle. End, 24" Thr. 1" thru 1".
PUNCH, H & J #4, 48" thr., with Shear Blades.

RIVET SETTER, ⅝" cap. Pneu. Tubular Rivet.
ROLLS, Bertsch Pyramid 18'x1¼" cap., M.D., Late.
ROLLS, #1 Buffalo Forge Wrapping, M.D.
ROLLS, 72"x1¼" Lown initial M.D., New.
ROLLS, #2 Buffalo Forge Vert. Angle, Bending, New.

COLD SAW, Wagner 10"x10" cap., M.D.
COLD SAW, Espen-Lucas #700, 48" dia. blade, M.D.
CUT-OFF SAW, Yates-American #M-90, M.D.
SAW, #48 Marvel Hack Saw 6"x8" Cap., M.D.
SAW, #20-C Racine Shear Cut 6"x8" cap., M.D.
SAW, Sand Tannewitz GH-36" High Speed, M.D.
SAW, V-26 DoAll Contour Band, Late.
SHAPER, 16" Pratt & Whitney Crank, M.D.
SHAPER, 20" Rockford Univ. M.D., Tilting Table.
SHAPER, G & E 24", high duty, back geared, M.D.
SHAPER, 32" Cinci., G.G., Motor Driven, M.D.
SHAPER, Morton, 36" Draw Cut, 4 speed M.D.
SHEAR, #26 Buffalo Forge Slitting Armor Plate.
SHEAR, Quickwork #11 Rotary 60" Throat, 10 ga.
SHEAR, 10' x 10 ga. Wysong & Miles, M.D., New.
SCREW SLOTTER, #2 Waterbury Farrel Auto, M.D.
SLOTTER, 12" New Haven Vertical, M.D.
SPRU CUTTER, Milwaukee 56 tons, 2½ cap., M.D.
SURFACE PLATES & TABLES, all sizes.
TAPER, #1 Cam Haskins, Motor Driven, Late.
TAPER, #1 Oakewell (Warner & Swasey) Late.
TRUCK, 2000 lbs. Hyster Fork Lift 9' Model GT-20.
TRUCK, 4000 lbs. LT-44 Towmotor Fork, Lift 9'.
BRINELL TESTER MACHINE, Type UK300M.
BRINNEL TESTER MACHINE, Type 85DR, Steel City.
WELDER, 500 amp. Westinghouse Flozers A.C.
WELDER, 200 & 400 amps. Gen. Elec. Portable Arc.
WELDER, 75 KVA Federal M.D., Spot.
WELDER, 200 KVA Federal, Projection.
WIRE STITCHER, Marrion and Acme, M.D

OVER 2000 MACHINE TOOLS AVAILABLE IN STOCK

UNUSUAL BUYS WITH GUARANTEED PERFORMANCE

PARTIAL LIST OF LATHES

American 24"x8' G.H., 12 spindle speeds.
American 30"x12', 3 SCD, 6' centers.
American 30"x14' G.H., 12 spindle speeds.
American 16"x8' bed, 3 SCD, bowl head.
American 14"x6', 3 SCD bowl head.
American 36"x10' bed Geared Head, 12 spindle speeds, 2-9/16" hole in spindle, vee belt drive.
American 20"x14' bed Geared Head, 12 spindle speeds, drop lever handles in apron, vee belt drive.
Boye & Emmes 20"x10', G.H., complete with taper attachment.
Greaves Klusman 22"x8' G.H. Lathe, complete with taper attachment.
Hendey 20"x10' bed Geared Head, 8 spindle speeds, 1⅝" hole in spindle.
LeBlond 17"x8' bed 3 SCD.
LeBlond 13"x5' Regal G.H. Lathe
LeBlond 27"x10', 3 SCD Lathe, 3'11" centers.
Lodge & Shipley 14"x5' G.H., single pulley drive, 12 spindle speeds, 20" centers.
Lodge & Shipley 16"x126" centers G.H., Timken bearing, drop lever handles in apron, late type.
Lodge & Shipley 16"x6', single pulley.

TURRET LATHES

Acme #2 Full Universal, single pulley drive, hole thru spindle 3½".
Gisholt 1-L Saddle Type Turret Lathe, with bar feed, late type.
Oster 601 Rapiduction.

BORING MILLS—Vertical

King 42", motorized, 2 heads on rail.
Niles 36"-44", 1 rail and 1 side head.
Niles 42"x50" Driving Box Borer, Burnisher and Facer, motor driven, late type.
42-50 Niles Vertical Boring Mill, one rail and one side head, late.

GEAR MACHINERY

Fellows 612 Spur Gear Shaper.
Fellows 725 Gear Shaper, with spur guide.
Gould & Eberhardt 18-H Hobber.
Gould & Eberhardt 96H Gear Hobber.
Gould & Eberhardt 60BM Gear Rougher.

GRINDERS—Cutter & Tool

LeBlond #2 Tool & Cutter Grinder, late.
Oliver Template Tool Bit Grinder, late.
Sellers 4T Tool Grinder, late type.
Sellers 6T Tool Grinder, late type.

GRINDERS—Internal

Heald 78 Centerless, Internal & Cylindrical, late type.
Heald #50, tight & loose pulley.
Heald #70A, new 1941.
Heald 72A3 Plain Internal Grinder, late type.

GRINDERS—Cylindrical

Landis 26"x168" centers Plain, arranged for motor drive with motors, 10 speeds 3 to 62.
Landis #2 Universal, 12"x35" centers, belt drive.
Landis 16"x72" Plain Cylindrical.

GRINDERS—Thread

Jones & Lamson 8x31, late type.

MILLERS—Auto. or Prod.

Hall Style "D" Planetary Mill, late type.
Ohio 40" Tilted Rotary Miller.
Sundstrand #2 Automatic Electromil, 24" table travel, late type.

MILLERS—Plain

Brown & Sharpe #3, 4 SCD.
Cincinnati #4, single pulley drive.
Douglas #0, rectangular overarm.
Milwaukee 2H Plain Miller, late type.
Milwaukee 2 HL Plain Mill, late type.

MILLERS—Vertical

Brown & Sharpe #3, single pulley drive.
Cincinnati #3, Single pulley drive.
Kearney & Trecker #4, motor in base, stationary head.

MILLERS—Universal

Brown & Sharpe 3A, motor in base.

DRILLS—Radial

American 5'14" column, Triple Purpose.
Fosdick 6'15", Heavy Duty Radial Drill.

PLANERS

Cincinnati 36x36x18', Double Housing.
Pond 48x48x16' Double Housing, DC drive, 4 heads.

SHAPERS

Averbeck 21" B.G., 4 SCD.
Columbia 28" B.G., gear box drive.
Gould & Eberhardt 20", B.G., gear box.
Gould & Eberhardt 24" B.G., gear box.
Gould & Eberhardt 28" B.G., gear box.
Gould & Eberhardt 32" B.G., gear box.
Potter & Johnston 24" Universal.
Smith & Mills 25" B.G., 4 SCD.
Smith & Mills 14" Plain Crank, Lima drive.

BOREMATIC

Heald #42, late type.

MISCELLANEOUS MACHINERY

Fitchburg 48" Spline Grinder, late type.
H&G Model I-K Threading Machine, late.
Hobart 200 Amp Arc Welder, late type.
Hoffman Heavy Duty Portable Cleaner.
Model #22 Rodgers Hand Track Press.
Speedare 150 Amp Welder, late type.
Taft Pierce Bench Center, 8"x48" centers.

AIR COMPRESSOR, 64 C.F. 1-R Model ER-1, Late
AUTOMATIC, 1¼" 4 spin. Gridley Model G
BOLT THREADER, 1½" Williams Reliance
BORING MILL, 180" N.B.P., 2 Hds., M.D.
BORING MILL, 190" Cinci. Massive, 2 Hds., M.D.
BORING MILL, 72" King, 2 Hds., P.R.T., M.D.
BORING MILL, 72" N.B.P., 2 Hds., P.R.T., M.D.
BORING MILL, 48" Colburn, 2 Hds., M.D.
BORING MILL, 4½" Bar Niles, Table Type
BORING MILL, 3½" bar Giddings & Lewis #0
BORING MILL, 3¼" Bar Binsse, Knee Type, M.D.
BORING MILL, 3" bar Lucas, Table Type
DRILLS, RADIAL, 4' Western, M.D. (2)
6' Amer. 15" col. Trip. Purp., M-on-Arm
5' Amer., 15" col. Trip. Purp., M-on-Arm
5' Amer., 14" col., Trip. Purp.
5' Niles #10 Rightline, Univ., Motor-on-arm
4' Amer., 13" col. M-on-Arm
3'8" & 2½' Arboga (Swedish), Late
TABLES, RADIAL, 36"x20"x20"
DRILLS, #8D Colburn 36", 5" capty.
#3¼ Baker, 24", 3" capty.
24" Cinci. Bick., Tapping, M.D.
#2LHS Leland Gifford, Deep Hole
DRILL, MULTI, 32 spin. W-7 Baush, 1947
FLANGERS, ¾" and ½" McCabe (2)
GEAR CUTTERS, No. 13 B. & S. Spur & Bevel
GEAR SHAPERS, Nos. 61A, 64, 64A & 75 Fellows
GRINDER, SURFACE, 12" Heald No. 22
GRINDER, SURFACE, 14"x36" P. & W.
GRINDER, 4"x18" Landis #4H, Cylindrical, Late
GRINDER, No. 6T Sellers Tool, 1942
GRINDER, Micro Internal, large capty.
GRINDER, 18"x144" Norton Cyl., M.D.
HAMMER, 1000 lb. Chambersburg Pneumatic, 1947
IRON WORKER, MK10 Pels, punch ¾"x¾", M.D., Late
KEYSEATER, No. 3½ Baker, 24" str. x 4" wide
LATHES, 48"x20' cen. N.B.P., M.D.
42"x28' bed L. & S., T.A., M.D.
48"x28' bed, Amer. T.A., Grd. Hd.
32"x14' bed Schumacher Boye T.A., M.D.
28'/48"x10' bed Hahn Larmon, Gap
26/48"x10' McCabe, Dble. Spin
26"x12' Bridgeford, QCG Grd. Hd., M.D. (2)
24"x12' bed B. & E., T.A., Grd. Hd.
20"x78" Matra, T.A., New
20"x10' bed Amer. Grd. Hd. M.D.
20"x10' bed L. & S., T.A., M-in-Base
18"x10' bed L. & S., T.A., Cone Motorized
18"x8' bel L. & S. Selective Grd. Hd., M.D.
16"x60" cen. P. & W. Motor-in-Base
16"x32"x8' Harrington Gap M.D.
16"x6' & 12"x6' Hendeys (2)
14"x6' bed Amer. T.A., M-in-Base
10"x5' bed P. & W. Toolmakers
No. 16 Bliss Spinning, M.D., 1945
No. 3x42" Hendey Turning (1200 r.p.m.)
TURRET LATHES, No. 3AL Gisholt, 6¼" H.S.
No. 3 Gisholt, 1942
No. 2B Foster Univ., 3¼" Capty., Bar Timken
No. 1B Foster Univ., 2" capty. M.D.
21" Acme Universal Brass, Late
18" Libby Model A Grd. Hd.
MILLER, No. 3 Cinci. Hi Power, Motorized
MILLERS, Nos. 2 & 3 Cinci. Hi Power Univ., M.D.
MILLER, No. 2 Stand. K. & T. Univ. #50
MILLER, No. 2 Van Norman Ram, M.D.
MILLERS, No. 2 Abene (like Van Norman) New
MILLER, No. 1½B K. & T. Univ., Grd. Hd.
MILLER, No. 000 B. & S. Plain, M.D., Late
MILLER, No. 9 Sundstrand Rigidmil, Hand
THREAD MILLER, 12"x60" Morey Shields, '42
PLANER, 36"x36"x10' Cinci., 4 Hds.
PRESS, 73½ Bliss S.S., 8" stroke
PRESS, No. 56 Toledo S.S., Grd., 171 ton capty.
PRESS, #3C Bliss 30", "Stiles", Late
SHAPERS, 32", 28", 20", 16" Gould & Eberhardt
SQUARING SHEAR, 8'x3/16" Geo. Ohl

BENNETT MACHINERY

375 Allwood Road, Clifton, N. J.
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"GUARANTEED MACHINERY"

3901 KELLOGG AVE. CINCINNATI 26, OHIO

No. 2 B & S High Speed Autos. M.D.
No. 25 Heald Rotary Surface Grinder
Hardinge Model MD-37 Lathe, ½" cap.
P & W 30" Vert. 2-spindle Profiler.

D. E. DONY MACHINERY CO.
4357 St. Paul Blvd., Rochester 17, N. Y.

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MACHINE TOOL REBUILDING

Renewed life at a fraction of New Cost

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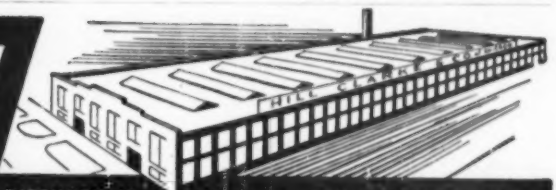
LAGOE OSWEGO CORP.

OSWEGO, N. Y. **PHONE 1763**

25"/32" x 96" centers AMERICAN Pacemaker Heavy Duty Engine Lathe, taper attachment, chucks, 25 HP AC motor, new 1948.

O'CONNELL MACHINERY CO.
1695 Genesee Street
Buffalo 11, N. Y.

HILL-CLARKE MACHINERY COMPANY



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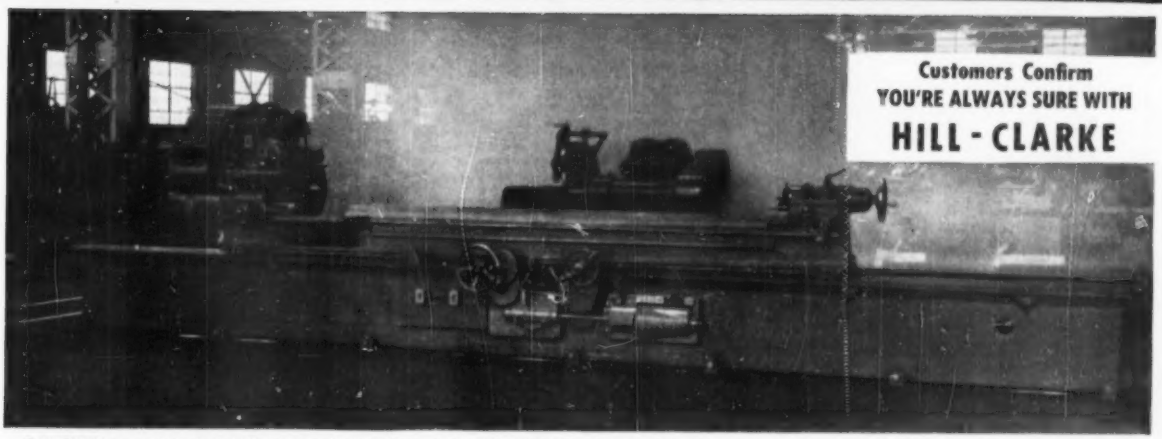
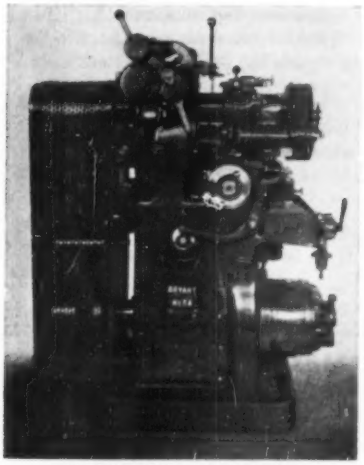


24" SWING x 144" CENTERS NORTON GRINDER GAP 35" SWING x 18¾" WIDE Photographed at our plant where it can be inspected.

AUTOMATICS
1-1/16" Model A Cleveland (1942)

DRILLS
1 Spdl—14" Sw—No. 2 Avey Cam Fd.
2 Spdl—24/ Sw—No. 3 Avey
D-31 Mox Multiple Drill No. 2 Taper

GEAR MACHINES
No. 12HS Gould & Eberhardt Hobber
11" Gleason Bevel Gear Generator
No. 64 Fellows Gear Shaper
No. 36-BM G & E 3 Spdl, Rougher
No. 612-A Fellows Gear Shaper
No. 615-A Fellows Gear Shaper
No. 65 Fellows—Cone Dr.
8" cap Red Ring Gear Lapper



INTERNAL GRINDER
No. 5-B Bryant Internal Grinder

Swing 6½". Traverse 2¾". Recommended bore range ⅛" to 2", swivelling work head for taper. Inspect at our plant.

LATHES
16"x33" R-14 Seneca Falls Auto. Lathe
19"x8' LeBlond Hvy. Duty Lathe
27"x12' American Geared Hd. Lathe
36"x18' Putnam Grd. Hd. M.D.
13¾"x39" Centers Dimco Lathe (New)
15"x39" Centers Dimco Lathe (New)
18"x59" Centers Dimco Lathe (New)
23"x60" Centers Dimco Lathe (New)
24"x39" Centers Dimco Lathe (New)
5W Acme Ram type Tur., 2" Capacity
No. 6 Warner & Swasey Tur.-Bar Fd.
18" Libby Tur. Lathe, M.D.
No. 3AL Gisholt Cross-Slide Tur.
No. 4A Warner & Swasey—7½" Hole—Spdl.

MILLING MACHINES
54"x30"x16' Ingersoll Slab Mill
6"x168" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney (1942)
12"x102" Lees-Bradner Thrd. Mill

GRINDERS
6" x 18" Landis (1942)
6" x 18" Norton Cylindrical (1943)
Hill-Clarke Type Motor Driven Grinc
10"x36" centers 10"x72" centers
10"x96" centers 24x32 Gap x144" centers
14"x36" centers 14"x72" centers
20"x96" centers
No. A-3—12" Arter Rotary Surf.
No. 22—12" Heald Rot. Gdr. (1944)

FULL MONEY-BACK GUARANTEE

1. Hill-Clarke always give you an unconditional money-back guarantee.
2. All machines in stock.
3. You can see your machine run and tested under power in our plant before purchasing.
4. Complete and modern facilities plus experienced craftsmen for REMANUFACTURING machine tools in our 58,000 sq. ft. plant.
5. A responsible organization—with 86 years' experience.

No. 1109 Bryant Internal Grd. (1951)
(9" swing—1" bore x 3½" grind stroke)
5B Bryant Internal Grd.
No. 16-16 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 81 Heald Centerless Internal
No. 74 Heald Internal Centerless

No. 2 AVEY CAM FEED DRILL,
for long run production use. 1½ HP AC Motor, 14" Swing, distance Spindle to table 31".

PLANERS
36" x 36" x 12' Cincinnati, 2 hds.
48" x 36" x 14' Gray, 2 hds.
48" x 48" x 12' Cincinnati, 2 hds.
60" x 48" x 27' American, 4 hds.

MISCELLANEOUS
1" 2" Dia. Cap. Micro. Hor. Hone—#200
¼"-1" Dia. Cap. Micro. Hor. Hone—#H-2
42"—18 gage Economy Power Shear
75 Ton R & K Straight Side Press
3 Ton Fox Hydraulic Press
2—12"x96" Magnetic Chucks
20'x1" cap Southwark Roll
15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
No. 0 Bakewell Tapper

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0502

RELIABILITY has been earned by
WIGGLESWORTH MACHINE TOOLS

AUTOMATICS
2½" Cone 4 spdle., well equipped, 1936.
#24 New Britain 4 spdle. chucker, 2½" cap.
¾" Model F Gridley, 4 spdle.

2" 4 SPINDLE CONEMATIC, THREADING SPDLE., TAPPING ATTACHMENT, BAR FEED, CONSIDERABLE TOOLING. EXCELLENT CONDITION. 1943

BORING MILL
42" Bullard New Era, rail & side head

GRINDERS
#2 Oliver arc face mill cutter, 1943
#76RA Rogers knife grinder, 76", late
Cinn. internal, 24" swing, 78" stroke
16x42" Landis Type D Crank Pin
14" Hammond WD carbide tool, late
14x120" Landis plain cylindrical
#104 Rivett Universal, 1942, rebuilt
#4 Bryant internal, auto. sizing
#33 Excello ext. groove, late type
#86—30" Gardner vert. disc grinder
14x36" Norton C semi-auto., cyl.
73 Heald Internal Centerless
73 Heald Internal, 1944, like new
P & W deep hole drill grinder, late
Model 1311 P & W contour, late

DRILLS
D-4 Colburn, #5 M.T., 3½" cap., 24" swing
5'13" Cinn. Bickford, mtr. on base
28" Cinn. sliding head, round col., older
Baker Hvy Dty, #5 M.T., p.f.
#2LMS Leland-Gifford, 26" hydraulic
#2 Allen, 2, 4, 6 spdle., #2 M.T.
Type 14 Natco 12 spindle
Model 4230 Bodine Drill & Tapper, 12 sta.
Moline Hole Hog, 2 spindle

GEAR MACHINERY
6" Gleason straight bevel generator
13LS Fellows lapper, late
7A Fellows, shaper high speed, hvy dty
61A Fellows, shaper, high speed precision

LATHES
42"x26' ctrs American, High Duty, 16 speeds
30"x10' American geared head, taper att.
48"x35' LeBlond Hvy Dty, taper, late
Gisholt Simplimatic, platen type, late

TURRET LATHES
#4 Gisholt Univ., air chuck, Timken, 1943
#3 J & L Univ. bar feed, 2" hole, late
#5 B & O Univ., chuck, pre-selector, late
#1A W & S Univ., 3" hole. #417,756
#1L Gisholt Universal, 3" hole, 1937
Libby type H, 24" swing, 8 spdle, speeds
#2 Simmons Microspeed, air chuck, late
#3 Gisholt Universal, late

SHAPERS & PLANERS
30"x30"x17' Cleve. Openside
48x48x14' Detrick & Harvey dble. hsg.
26" Smith & Mills shaper, 4 step cone

MILLS
08 Cinn. horiz., auto. cycle, 1943
#1½B K & T horiz., dble. overarm, rebuilt
10C Van Norman Contour

THREADERS
8x16" Hanson-Whitney Universal, mill, late
6x80" P & W miller, splining & milling
Lees Bradner Model B Cridan, late
#50 Excello Precision grinder, 28x68"
13" Automatic Machinery miller, late
#2 Dalzen grinder, 3" o.d. cap., late
LT636 Lees Bradner mill, 18 x 36", late
1½" Landis, 2 spdle., lead screw type

FURNACES
Whiting Converter, 2 ton cap., late
Model SP Juthe, gas, 1000° F
Lithdraw heat treat, 1200° F, late

PRESSES
#37 Excelsior dble. crank, 45 ton
250 ton Elmes hyd. shell nosing, 21½" str.
Ferracute type EG-52 embossing, 150 ton
#57 Toledo, 150 ton, s.s., s.c.
#4 Toledo OBI, 25 ton, 2" stroke

MISCELLANEOUS
SHEAR: 12' 14 gauge Stamco, 10 HP
SHEAR: 40A Quickwork rotary, 48" throat
WELDER: Sciaky 40 KW press type spot
TAPPERS: Haskins 2CAM, 5/16" late
Cleve. Model EO, ½", late
WELDER: 75 KVA Federal spot, PA-1-18
KEYSEATER: #6-38 Mitts & Merrill, 4 x 36"
SPINNING RIVETER: Grant 5 spdle.
HAMMER: 300# Bradley Upright Helve
WELDERS: Hobart and P & H Arc, 400 amp.
BULLDOZERS: #2 Ajax High Speed, 30 ton

T. R. WIGGLESWORTH MACHINERY COMPANY
1719 SUPERIOR AVENUE • • • SUPERIOR 1-8727 • • • CLEVELAND 14, OHIO

LATE MODEL MACHINE TOOLS . .

AUTOMATICS
No. 656 New Britain Chucker, 1943
3" Model A Cleveland, 1941
1⅝" Model A Cleveland, 1943
1-1/16" Model A Cleveland, 1943
No. 00G Brown & Sharpe, 1941

BROACHES
HP-100 La Pointe Horiz. Broach, 1945

DRILLS
Ma-6 Avey 4 Spindle, H.F. 1943
Allen Single Spindle Drill & Tapper, 1942
No. 2 LMS Leland-Gifford H.F. 1942

GEAR EQUIPMENT
No. 7 Gleason "Revex" Rougher, 1943
No. 6 Gleason Revacycle Generator, 1940
No. 72 Fellows H.S. Gear Shaper, 1942
10" Pratt & Whitney Hyd. Gear Grinder, '42

GRINDERS, CYLINDRICAL
14"x168" Norton Plain Type "C", 1942.
10"x18" Norton Plain Type "C", 1940
6"x30" No. 12 B&B Hydraulic, 1940
No. 5 Brown & Sharpe Plain, 1941
No. 2 Cincinnati Centerless Grinder, 1944

GRINDERS, INTERNAL
No. 72-A3 Heald Plain Hydraulic, 1942
No. 24-36 Bryant Hydraulic, 1943
No. 16 CP 16 Bryant Hydraulic, 1942
No. 16-16 Bryant Hydraulic, 1942
No. 172 Heald Hydraulic, Gap, 1940

GRINDERS, MISCELLANEOUS
No. 18A Blanchard Auto. Surface, 1942
Cincinnati Centerless Lapper, 1942
No. 600 UK Hanchett Face Grinder, 1946.
No. TG-636 J&L Thread Grinder, 1942
HRS Barber-Colman, 1942.

GUN BARREL MACHINES
No. ½ B x 50 P & W Reamer, Latest
No. ½ B x 30 P & W Reamer, Latest
No. ½ B x 50 P & W Rifler, Latest

LATHES, ENGINE
36"x296" American Geared Head, M.D.
27"x192" Niles Timesaver, 2 Carr, 1941
27"x132" Monarch Auto. Sizing, 1942
27"x96" Niles Timesaver, 1940
26"x180" Betts Bridgeford, 1940
26"x96" Betts Bridgeford, 1940
18"x80" Safop Gap Bed, Unused.
16"x20" EE Monarch Toolmakers, 1943

LATHES, PRODUCTION
No. 5D Potter & Johnston Automatic, 1943
8"x84" Lo-Swing Semi-automatic, 1941
Lipe Carbo-Matic Lathe, 1942

LATHES, TURRET
36" Bullard VTL, Spiral, Late.
No. 1A Warner & Swasey Saddle Type, 1941
No. 5 Warner & Swasey Ram Type, 1942.
No. 3R Gisholt Universal Saddle Type, 1943
No. H5 Libby Universal Saddle Type, 1939
No. 5 GISHOLT Universal Ram Type, 1942

MILLS
No. 1848 Milwaukee Duplex, 1942.
M-18 Milwaukee, 1943
No. 3 Cincinnati Univ. Dial Type.
No. 00 CINCINNATI Rise and Fall, 1942.

MILLS, TOOL ROOM
No. 3 Van Norman Plain, 1942
No. 2 Saimp Vertical, New
No. 2 Saimp Universal, New
No. 2 MI Cincinnati Plain, 1951
No. 2L Van Norman Plain, 1942

SHAPERS
16" Gernetti Universal Shaper, New
20" Gernetti Universal Shaper, New
18" Brook Universal Shaper, New
24" Gernetti Universal Shaper, New.

PRESSES
650 Ton Versen Dbl. Act. Eccentric, 1940
No. 166 Toledo Toggle Press.

Partial Listing — Write for latest stock list

INDIANAPOLIS Machinery & Supply Co.
1961 S. Meridian St. • • Indianapolis, Indiana

NEW AND USED

1—Potter & Johnston auto. Turret Lathe Model 6-DREL

1—Herbert Universal Turret Lathe #4

1—Double Spindle Vertical Profiler

3—Cincinnati Vert. Mills #0-8

3—Girards Radial Drills 3 ft., 4 ft. & 5 ft.

2—Double end Centering Machines 10x42

1—Jones & Lamson auto. Thread Grinder 7G-6x36

1—Landis Hydr. Internal Grinder 15x8

1—Logan hydr. Press, cap. 5 ton

2—Hi-speed V-Ram Shaper 20"

MACHINE & TOOL CO.
Long Island City 1, N. Y.
ST 4-2726

MACHINERY FOR SALE

1—Production Air Tracer Lathe, 13" x 42" Monarch Monamatic with 15 hp motor, 1800 rpm, serial #MM31848-AT, purchased in February, 1949. New machinery guarantee. Fully equipped.

1—24" Bullard Vertical Turret Lathe, serial #16496, purchased in 1940. 15 horsepower motor, 220 volt, 3 phase, 60 cycle, with Coolant Tank.

2—Gleason Bevel Gear Generators, serial #9449 and #13830, in excellent condition.

FS-6799, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

1941-1953 MACHINE TOOLS

IMMEDIATE DELIVERY — NO PRIORITIES NEEDED

CAM MILLERS

VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

CENTERING MACHINES

SUNDSTRAND: 44" Double End Centering Machine

CUTTER & TOOL GRINDERS

FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New) automatic indexing

DRILLING MACHINES

ALLEN: #2 High Speed, 15" overhang
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
SUNDSTRAND: 44" Double End Centering Machine

GEAR CUTTING MACHINES

BROWN & SHARPE: No. 6 Gear Cutter, 72" diameter, 1¾ D. P. capacity
CLEVELAND: Model 130 Gear Hobber (like new)
CLEVELAND: Model 140 Gear Hobber (like new)
FELLOWS: 61A Shaper, 18" dia.
FELLOWS: 64A Shaper, 18" dia.
FELLOWS: 72 Shaper, 7" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
GLEASON: 3" Straight Bevel Gear
SYKES: Gear Shaper 14" external, 20" internal (New)
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)

GEAR AND SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
GEAR GRIND MACH: GG-19, 10"x 24" Hydr. Spur Gears and Splines

GEAR FINISHERS & TESTERS

FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 capacity 6"x18" plain
CINCINNATI, 6"x18" Hydraulic, Plain
LANDIS: 16x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 10"x18" 45° angle wheel

3-WAY GUARANTEE

1. **Should any machinery purchased from us prove unsatisfactory, you can return the machines within 30 days, via freight prepaid to our plant, and a full refund will be made.**
2. **Machines at our plant can be demonstrated and tested under power before purchasing.**
3. **You are dealing with a well-established, highly-rated firm of machinery engineers with over 33 years of proven responsibility.**

GRINDERS—GEAR & SPLINE

GEAR GRIND MACH.: GG-19, 10"x 24" Hydr. Spur Gears and Splines
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
HEALD: 72A3 Sizematic Centerless

GRINDERS—RADIUS

VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #639, capacity 7"
VAN NORMAN: #649, capacity 6" to 16" diameter
VAN NORMAN: #3½ Un. Radius

GRINDERS—THREAD

EXCELLO: #31 External, dia. 5"x18"
JONES & LAMSON: #636 Universal, 6" dia. x 36" centers and one extra multiform wheel dressing attachment

HONING MACHINES

MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2-spindle, ¼" to 1" dia.

JIG BORING MACHINES

LINDNER #14 & #15 Jig Borers, new

LAPPING MACHINES

FELLOWS: 8LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES PRODUCTION

BLOUNT: Polishing speed lathe 12" dia. x 48" centers
H.E.B.: High production hydraulic duplicating and copying lathes (new)
LODGE & SHIPLEY: #3A Duomatic. 25½" swing x 27" centers
POTTER & JOHNSTON: #6 DREL Automatic
PROGRESS: Geared head 16" to 30" swing (New)
New Engine Lathe 49" swing x 20' centers
New Engine Lathe 27" swing x 23' centers

LATHES—TURRET

WARNER & SWASEY 1A Turret Lathe
WARNER & SWASEY #3 Turret Lathe
HERBERT: #2, #4, #7, and #8 Sizes (new)
WEBSTER & BENNETT: Vertical Turret Lathes 36" & 48" (New)

MILLING MACHINES

TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: Duplex Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

SAWS & CUT-OFF MACHINES

CAMPBELL: No. 425 Cutalator Abrasive Cut-Off, 4½" dia. capacity
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)

THREAD MILLERS & TAPPERS

HALL PLANETARY: Model "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: 40A Thread Miller
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity, single spindle
NATCO: Vertical Tapper 16 spindle

WIRE FORMING MACHINES

BAIRD: 4-slide wire former
HEENAN & FROUDE: Wire forming, 4-slide machines (new)

MISCELLANEOUS

CENTERING MACHINE: Sundstrand, 44" Double End.
CUTOFF: Campbell, abrasive 425 Cutalator 4½" dia. Capacity
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½ & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
LATHES: Blount Polishing Speed Lathe, 12" dia. x 48" centers
GOGAN BRINELL Hardness Tester Model 16-J
SHAPERS: Klopp 16 to 26½" (New)
SHAPERS: Hercules 16" & 22" (New)
WIRE FORMING MACHINES: 4-slides (new)

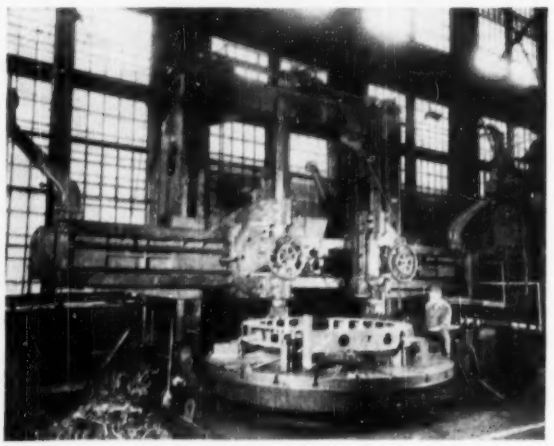
INSPECTION INVITED — Telephone HAnover 2-4520

TRIPLEX MACHINE TOOL CORP.

75A West Street, New York 6, New York **Cable Address TRIMACTOOL**

MACHINE TOOL ENGINEERS SINCE 1919

NILES 144"-2 HEAD VERTICAL BORING MILL



RECENT ADDITIONS TO STOCK

BORING MILLS

Bullard 34" New Era Vert. Turret
Bullard 24" M.D. New Era. Vert. Turret

GRINDERS

Cinn. No. 4 Centerless, Thru-feed
Blanchard #16A Vertical Surface
Norton 10"x36", 10"x50", 14"x96" Plain
Landis 10"x18" Hyd. M.D. Plain C

MILLERS

Rowbottom up to 32" M.D. Cam Miller
Van Norman 22LU M.D. Univ. Duplex
Potter & Johnson 2M Horiz. Auto.
Cincinnati 08 Plain Horiz. M.D. Production with Rise and Fall Attachment.
B & S #12 Plain M.D. Production Miller

PRESSES

Henry & Wright 50 ton M.D. Dieing
Clearing Model DS-1500-60, 500 Ton Double Action Press, 1942 Machine
Cleveland 400 Ton #4K Knuckle Joint

LATHES

Reed Prentice 20"x54" centers Geared Head. Q.C.G. 16 Speed.
Hendey 20"x14' Bed M.D. Geared Head Eng.
Lodge & Shipley 24"x10' Bed 12 Speed—Selective Head Geared Eng.
Bardons and Oliver #2-1" Elect. Geared
Gisholt No. 4 Turret Lathe
Potter & Johnson #4D-21" M.D., H.S.
Gisholt No. 5 M.D. Ram Type Univ.

SEND FOR YOUR COPY OF OUR BOOKLET ON OUR REBUILDING

BOTWINIK

BROTHERS, INC.
313 WELTON STREET
NEW HAVEN 9, CONNECTICUT

OVER FIFTY YEARS OF RELIABLE SERVICE

LATE MODELS

Reid 2A Surface Grinder
No. 9 Herbert Univ. Turret Lathe
20" x 8' Lodge & Shipley Lathe
No. 25P Van Norman Plain Mill, 1941, Rebuilt
No. 624 Fellows Gear Shaper AC Motor, Bargain
No. 2C Oliver Arc Face Mill Grinder
No. 1 Bliss Toggle Press 7" Plunger Str. 3½" Blank Holder Str. M.D.
42" Throat, Wickes Heavy Duty Punch w/Architectural Jaws
#3 Bardons & Oliver Univ. Turret Lathe
U. S. Multi-Miller, Late Model.

A&J MACHINERY CORPORATION
24-34-35 th Street
LONG ISLAND CITY 3, N.Y.

MACHINE TOOLS

LATE-TYPE
No. 3 FELLOWS STRAIGHT LINE GEAR GENERATOR

KEARNEY & TRECKER
M-24 MILL

WRITE TODAY!

LINCOLN MACHINERY
433 N. LARAMIE AVE. CHICAGO 44, ILL.

FOR SALE

#0 Brown & Sharpe Omniversal Milling Machine complete with standard equipment.

This machine is *NEW* and is offered at a very liberal discount.

FS-7653, AMERICAN MACHINIST
330 W. 42nd St., New York 36, N. Y.

NEARLY NEW (1948)

GLEASON #7 HYPOID CUTTER SHARPENER. Ser. #24768. Hand Index, Hand Feed. Coolant.

W. C. COWDEN MACHINERY CO.
1207 W. Genesee St., Syracuse 4, N. Y.
Phone 37787

ELECTRIC FURNACE TO 1850°

with Auto Temperature Control. Sliding door. Cheap to operate. Substantial Dependable for Machine Shop, Tool Room.
8" x 12" x 15" inside 4.5 K.W. $250.00
12" x 16" x 20" inside 9.0 K.W. $450.00

E. H. WILLIAMS
BOX 9042A, HUNTINGTON, W. VA.

"I get some very nice inquiries through my AMERICAN MACHINIST advertising"

The foregoing is quoted as the comment of a dealer in used equipment whose advertisirg frequently appears in "Searchlight". The reason he "gets some very nice inquiries" is because—in the Searchlight Section of AMERICAN MACHINIST—the advertising comes to the attention of machine tool buyers throughout the metal-working industry.

Have you equipment for sale? If so, why not let this "Searchlight" advertising help you find buyers?

Classified Advertising Division

AMERICAN MACHINIST

SOME LATE MACHINES STILL AVAILABLE

BORING MILLS

Bullard 24" V.T.L., Spiral Drive
Cleveland 2½" Bar Capacity
Giddings & Lewis #32, 3" #25, 2½" Cap.
Kings 42", 72" Vertical 2 rail heads
Niles-Bement-Pond 4", 4½" Bar, 60" Vert.
Niles-Bement-Pond 60" Vertical
New 3" Horizontal Boring Mill

DRILLS AND RADIALS

Brand New Radials
American 6'x15" Universal
Baker No. 321 Vertical Boring & Drill
Bausch Multi-spindle
Buffalo #2 Motor Spindle, #16—4 Sp
Buffalo: Power No. 41, No. 42
Canedy-Otto 21" Sliding head New
Cincinnati Bickford 6'x15" col.
Edlund 8" Model 2B, Sliding Head
Natco #12 20 spindle drill
24" Sibley Sliding head
New Geared Box Col. Drills 24'
Foote-Burt #25 3" capacity
Leland Gifford 2 LMS, 3 MS

NEW VERTICAL MILL

ENGRAVERS

Gorton #1A, ME, 1D, 3Z, Deckel G1L, G1, GK2
Taylor-Hobson 3 dimensional Pantograph

GEAR EQUIPMENT

Barber-Colman Mod. SHS. Sharpener
Barber-Colman #2, #12 (3)
Barber Colman Hobber Type S
Browne & Sharpe #3 Gear Mill, 26" Cap.
Fellows High Speed Shapers 712, 725, 71, 7
Fellows #20M Rodliner, Flather 72" Cutter
Gleason #2 Surface Hardener, No. 3 Gear Tester
Gleason #3 Spiral, #3 Straight Bevel
Gould & Eberhardt 36" Cutter
Michigan Gear Finisher 24" cap., 862-24A
National Broach Red Ring Lapper, Finisher
Schuchardt & Shutte #1 Hobber

GRINDERS, MISCELLANEOUS

Browne & Sharpe #2 Universal 14"x28"
Brown & Sharpe #3, 3"x18" Cylindrical
Browne & Sharpe #3 Universal w/Internal Sps.
Browne & Sharpe #13 Universal Tool & Cutter
Bryant #5 Internal, chucking
Cincinnati 6x18" Hyd. #4—Centerless
Gardner Disc Grinder 30"—15 H.P. Motor
Grenby Models 1G1 & 1G2—Internal
Gorton Ped. Type Tool Grinder Mod. 375-2
Heald #73 Internal Centerless, Sizematic
Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic
Landis 6"x30" Type C Cyl., 10x24 Univ. 12x30
Norton Type C 6"x18" Semi-Automatic cyl.
Norton 10"x18" Type C cylindrical
Norton 14"x96" cyl., 16x48 Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer
Pratt & Whitney Radius Model R6
Rivett Internal with External Sps. Model 104
Sellers 6-G Drill Grinder
Sellers 69 Tool K.O. Lee tool
Van Norman #666 Crankshaft
Wicaco Internal

NEW IN STOCK

Air Hydraulic Presses — Arbor Presses #6C Famco — Band Saws Johnson Kalamazoo — Famco 6x12" — Drill Presses all sizes—Hydraulic Press Northern 20 Ton—Injection Molders, 1 ounce—Power Presses, OBI, 1, 4, 4½, 5, 7½, 10, 15, 20, 30 55, 85 ton—Shapers, 7", 8", 14", 18" Shaperite—Shears, Foot 22" to 8', 16 & 18 ga.—Shears Power 3'x18 gauge to 10' x 10 ga.—Welders, Arc, Seam, Spot, all sizes Motors Grinders Buffers.

AUTOMATIC SCREW MACHINES

Brown & Sharpe (2) Model 2G, serial No's. 8500 series, 1¼" capacity.
Brown & Sharpe (9) Model 0G, serial No's. 9600 & 10700 series, ⅝" capacity.
Brown & Sharpe (6) Model 00G, serial No's. 14, 15, 16 & 17000 series ⅜" capacity.
Ceco Screw Machine ⅜" capacity.
Cleveland, Model AA-11, Serial #36586.
Cleveland Model B. Serial #42618/843, 1-1/16" capacity.
Conomatic 4 Spindle, Serial 2309FF, 1½"
New Britain Gridley 61 6 Spindle, Serial No. 25410, 1⅜" capacity.

GRINDERS, SURFACE

New 8x24" Hyd. Feed, 10x18", 6x18"
Abrasive 8x24", #33 Vert. & #34
Blanchard #16, 26" Mag. Chuck
Browne & Sharpe #5, #2 with Chuck
Heald 22—12" chuck, Arter 12", Covel No. 15,
Norton 6x18" Hydraulic Vertical
Portman 12" Chuck Rotary
Pratt & Whitney 12x36" Vertical
Thompson Hyd. 8"x24" Hor., Spindle
Taft Pierce #1 Precision

LATHES

American 14"x30", Bridgeford 36"x20', 32"x16'
Gisholt Simplimatic 18"x16½, 2 Tables
Hendey 12"x42" and 12x30", 1941
Hendey 14" Yoke Head Lathes
LeBlond Regal 10"x3' bed, 13x42", 17"x30" Late
LeBlond 25/50x96" Gap, Late type.
Lipe-Carbo 12"x18" (2)
Lodge & Shipley #3A, Duomatics
Pratt & Whitney 16"x60, 10"x20", 16"x36
Monarch Magna-matic 14"x54"
New 16, 18, 20", 28" Immediate Del.
New Tool Makers 10x24", South Bend 9"
Reid Small Piece #9WSL, Sheldon 12"
Rivett Model 918 Precision. Mod. 715
Putnam, Sliding Gap 22"/46"x92"
Sundstrand 8x15", 15' Stub
Wickes 32"x35' Geared Head

MILLS, PLAIN, UNIV. PROD.

Brand New Universal Mills No. 1, No. 2
Archdale Plain, 14" Production
Brown & Sharpe #3B Plain. No. 2, 3A, 21, #2L
Cinn. No. 3, 4 Plain Spd., 18" Manufacturing
Kent Owens IV, 1-8, 1-14, 1M
Kempsmith #1 Pl., Vert. & Div. Hd.
Milwaukee 2H Univ., 2H Plain.
Milwaukee #2B, Plain & Univ.
Sundstrand #00, 0, Rigidmils
Sundstrand #3A Rigidmil with copying Attach, 33
Van Norman #2L Univ., Dividing Head

MILLS, VERTICAL

Brand New Vertical Mills
Cincinnati 2 Spindle Hydromatic
Cincinnati (2)—1-18 Plain Automatic
Cincinnati #3, #4 hi-power, 08 Vertical
Cleveland No. 1, table 8"x32"
Morey #12M Profiler, 2 sp. 2 Maximiller.
Reed Prentice Vert. Mill & Die Sinker Mod. 3VG

PRESSES

Bliss No. 1 Double Action Drawing Presses
Bliss 645, 650 Hi-Production Presses
Bliss 18, 19, 21, OBI, 58, 62, 162, OB
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton SS, Bliss 74½
Bliss 5-48 Dbl. 32x48" bed, Cushion
Hamilton 850 Ton S.S. Bed 27x48
Hamilton 110 FM Die Tryout Press
New 85, 60, 55, 30, 20, 15, 10, 5 Ton O.B.I.
Niagara Horning, 15 Ton—Toledo 32 Ton Honing
Niagara A1¾, O.B.I., Niagara No. 27
Stokes Tablet Press, type R, Late, Model F
Toledo 92½c Double Crank 43x23" bed
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing
Walsh No. 3 O.B.I. 23 Ton, LI #3
Z & H #4½, O.B.I. 20 Ton

TURRET LATHES

Acme 6W Fox 2-916" Cap. #2 Cross Slid. Turret
Bardons & Oliver #2, 3, 5, 7, Bar Feed
Brown & Sharpe, #2 Hand, #10, 11
Denver 6 2" Shell Turret (2)
Foster #2B 2½" Cap. Morey #2G Late
Gisholt 2L, Cross Slid. Tur.
Gisholt #5, Bar Feed, Plenty of Tools
Gisholt 4R—9¼" hole in spindle
Jones & Lamson No. 5 Bar Feed
Libby 1HS with threading att.—3R, 4R
Oster 601 WD. #2 Simmons Microspeed
Warner & Swasey #1, 1A, 2, 3, 4, 5

MISCELLANEOUS

Band Saw: New Kalamazoo & Johnson
Bolt & Pipe Threader: Landis, Oster-Williams
Boring Bar: Underwood 4"
Broach: New 6 Ton, Horizontal, 11 Ton Vertical
Hacksaw: Peerless 6"x6", Racine 6"x6"
Hand Mill: Whitney
Hoist: 5 ton capacity 7½ HP motor
Honer: Micromatic H-4, MC1H—Sunnen—Mod. MA
Jig Borers: New Swiss
Keyseater Davis. Baker
Oil Groover: WICACO
Pipe Bender, Kane & Roach, Vari-drive
Planer: Niles-Bement-Pond 36x36'x10'
Rotary Table: Cincinnati, power take-off
Saw: Shaping 6x6", 13x13"
Scrap Cutters & Granulator: Ball & Jewell
Shapers: 24" Rockford, 24", 28" Gould & Eberhardt. Cinn. 20, 24", Columbia 36"
Shears Power, 10' 3/16", 10" x 16 gauge
Vertical Milling Att. New, Bridgefield
Tapper: Haskins—2C, 1A, Bakewell #2
Welder 50 KVA Eisler Air Operated, New Seam.
Welder: Taylor-Winfield 50 KVA Hi-Wave

New Lathes 16" to 28", Mills, Boring Mills, Broaches, Shears & Presses

HYDRAULIC EQUIPMENT

8 and 9 oz. Injection Moulders
125 Ton Southwark Press, Bed 96"x30", 30" stroke. 2 to 4 ft. opening
150 Ton Triple Action HPM Press
200 Ton W.F. Hobbing Press
250 Ton Watson & Stillman 28x24"
300 Ton Watson & Stillman 24x29"
300 Ton Watson Stillman 20"x20" Platen 8" St. 19" opening
600 Ton Williams & White 42"x60"
800 Ton Williams & White 42"x60"
800 Ton W&S Hobbing Press

All Hydraulic Equipment is completely engineered and checked by a competent staff thus assuring reliability.
Send us your Hydraulic problems.

This is but a partial listing. Write for free Catalog. Inquiries invited. HUNDREDS OF OTHERS

AARON MACHINERY CO., Inc., 45 Crosby Street, New York 12, N. Y.

"CABLE—AARMACH N. Y." **Telephone WOrth 4-8233**

New Surplus Coolant Pumps in Original Factory Boxes, built to sell for $49.50 each

OUR PRICE

$20.00 each F. O. B. Detroit

2½ Gallon Tank. 240 Gallons per hr. Both feed and return lines. 110 volt A.C. current.

For Turret Lathes, Mills, Grinders, Saws or wherever a soluble coolant solution is required.

ORDERS ACCEPTED AS LONG AS STOCK LASTS. All orders shipped Railway Express unless otherwise specified. Send check or money order. Money back in 10 days if not satisfied.

SORENSEN MACHINERY CO.

Buyers of Surplus Materials

Diamond 1-1440

14849 LIVERNOIS AVE.
DETROIT 21, MICH.

FAIR DEALING PRICES FROM FAIRFIELD

A DEALER OF ESTABLISHED REPUTATION

#3 Baker Keyseater

6" x 18" Norton Type C Cylindrical Grinder (Late)

#3L Gisholt Universal Turret Lathe (1942)

#4A Warner & Swasey Universal Turret Lathe, Serial No. 418157

Model 3 Newark Universal Gear Hobber (1943)

FAIRFIELD EQUIPMENT Company DEALERS IN USED REBUILT & NEW MACHINERY

100 SANFORD STREET at R.R. Station Phone FAIRFIELD 9-3321 FAIRFIELD, CONN.

MODERN MACHINES

Cincinnati #3 HI-POWER Vertical Miller Serial #E649H—Rebuilt and guaranteed.

Heald #25A Rotary Surface Grinder—Serial #4577 Reconditioned and guaranteed

3'9" Column Cincinnati Bickford Radial Drill Serial #2A-41—new 1936—Rebuilt & guaranteed

72" King Heavy Duty Vertical Boring and Turning Mill—Serial Lot 38-#175 Rebuilt & guaranteed

4½" Bar Giddings & Lewis #45 Table Type Horizontal Boring, Drill and Milling Machine—Serial #8150. Reconditioned & guaranteed

Ingersoll Adjustable Rail Planer Type Milling Machine—Serial #3150—Reconditioned and guaranteed

#64 Fellows Gear Shaper Ser. #26113

#64A Fellows Gear Shaper—Ser. #25634

Rebuilt 6' 15" Column American Triple Purpose Radial Drill—Serial #55592. Rebuilt & guaranteed

60" Hanchett Face Grinder—Reconditioned and guaranteed

6D Potter & Johnston Automatic Chucking Machine Serial #70393

16" Gould & Eberhardt Shaper—Ser. #66737

HAZARD BROWNELL MACHINE TOOLS, INC.
350 Waterman St., Providence, R. I.

IMMEDIATE DELIVERY

BLISS No. 5-S Double Action Toggle Draw Press, Bed Area 38" x 33", Stroke of Blankholder 10", Stroke of Plunger 21", Air Clutch. New in 1945.

BLISS No. 88 Straight Side Single Crank Press, Bed Area 30" x 29", 18" Stroke of Slide, Marquette Air Cushion, 255 ton Capacity.

TOLEDO Double Cranks, Nos. 91-42, 92C, 93½C, 93½E.

CLEVELAND Double Cranks 65-G-72, 45-D-60.

NIAGARA Double Cranks, 67C, 68C, 612C.

BLISS No. 25K Knuckle Joint 600 Ton Capacity.

NATIONAL MACHINERY EXCHANGE
128 Mott St. New York, N. Y.
Canal 6-2470

LATE MODEL MACHINES

#2 Warner & Swasey Electric Turret Lathe. Late model.

4"x12" type H Landis Cylindrical Grinder. 1944.

6 DRE Potter & Johnson Automatic Turret Lathe.

Worthington duplex Air Compressor. 665 CFM. 125 h.p. Very little use.

All the above items are in excellent condition.

C. S. MacDONALD, INC.
1236 Parker St. Springfield, Mass.
Phone: 3-9569, 7-4040

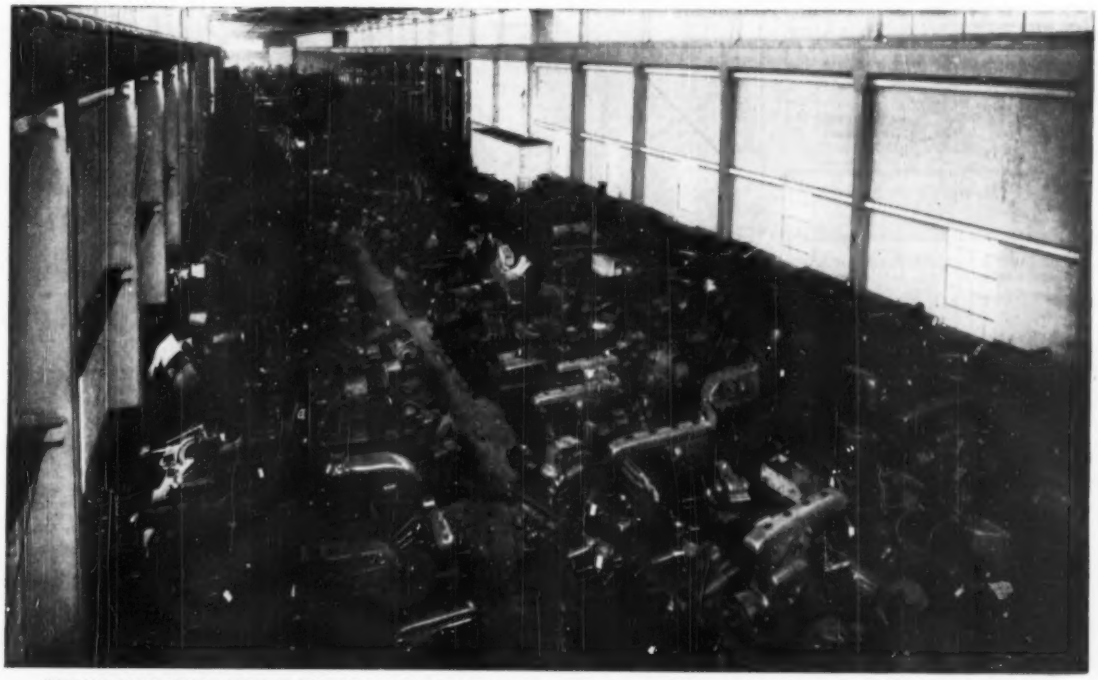
ZEISEL

#2L GISHOLT Univ. Turret Lathe
#2MH CINCINNATI Horizontal Miller
#22L VAN NORMAN Ram Type Miller
13"x30" PRATT & WHITNEY Toolroom Lathe—Taper Collets
In Stock For Immediate Delivery

MACHINERY CO.
208 Centre St. New York 13, N.Y.
COrtlandt 7-9858

Eastern Rebuilt Machine Tools

THE SIGN OF QUALITY — THE MARK OF DEPENDABILITY



MAIN WAREHOUSE BAY IN EASTERN'S 11 ACRE CINCINNATI PLANT — THE LARGEST MACHINE TOOL PLANT IN THE U.S.A. DEVOTED EXCLUSIVELY TO REBUILT MACHINERY.

GEAR TESTERS

No. 1 Brown & Sharpe Spur Gear Tester
12" cap. National Broach & Machine Co.
18" National Broach & Machine Co.

AUTOMOTIVE GRINDERS

Kwik-Way Model H Piston Turning & Grinding Machine, m.d., late
No. 76 Van Norman Automatic Piston Turning & Grinding Machine, m.d., late

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d.
Cincinnati Valve Seat Grinder, cap. ¾" valve stems, m.d.

PLAIN CYLINDRICAL GRINDERS

6x18" Landis Plain Self-Contained, m.d.
6x18" Landis Type C Hydraulic, m.d., late
6x30" Cincinnati Hydraulic, m.d.
No. 10 Brown & Sharpe Self-Contained, m.d.
No. 11 Brown & Sharpe Self-Contained, m.d.
10x36" Cincinnati Hydraulic, m.d.
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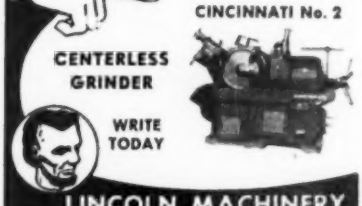

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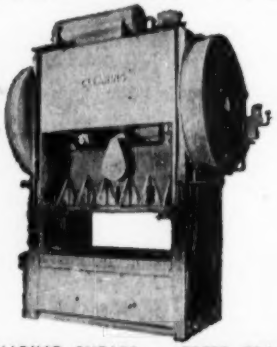

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• Fast, snap-action MICRO switches provide a flexibility of control hitherto unknown in the operation of Limitorque Automatic Controls for the operation of valves on steam, air, gas, water and oil lines.

Nine MICRO switches are used in the 4-train gear limit assembly. Eight switches permit various adjustments in the gear train to open and close different circuits with rotations of the drive shaft. The ninth switch cuts off the motor when the design torque load is exceeded.

Engineers of Philadelphia Gear Works, makers of Limitorque Controls, chose MICRO switches for this use because of:

1 High electrical capacity.
2 Extremely rapid make-and-break action.
3 Provision of more electrical circuits.
4 Small size to aid compact design.

This selection of MICRO switches as important components of equipment which must give years of long-life performance is typical of the confidence placed in MICRO products by design engineers in every phase of industry. MICRO field engineers, with more than 6,000 varieties of precise snap-action switches from which to choose, are available to consult with you on the most complex switching problems. We invite you to contact the nearest MICRO branch office.

MICRO A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

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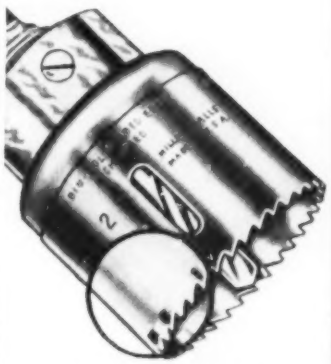

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IF you resent interruptions when you're busy, set the example by not interrupting others when they're busy. If you are careless with your men's privacy, you can expect them to be careless of yours.

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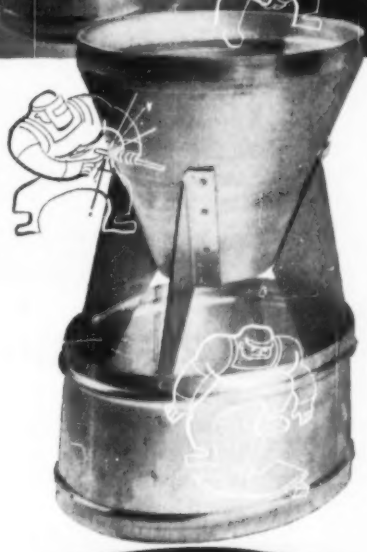

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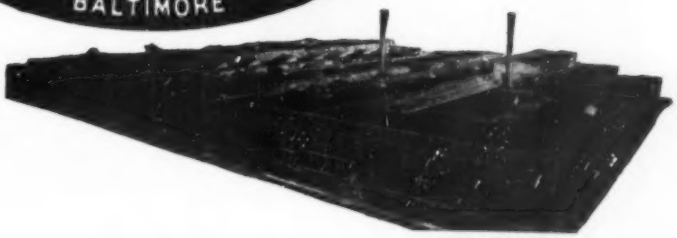

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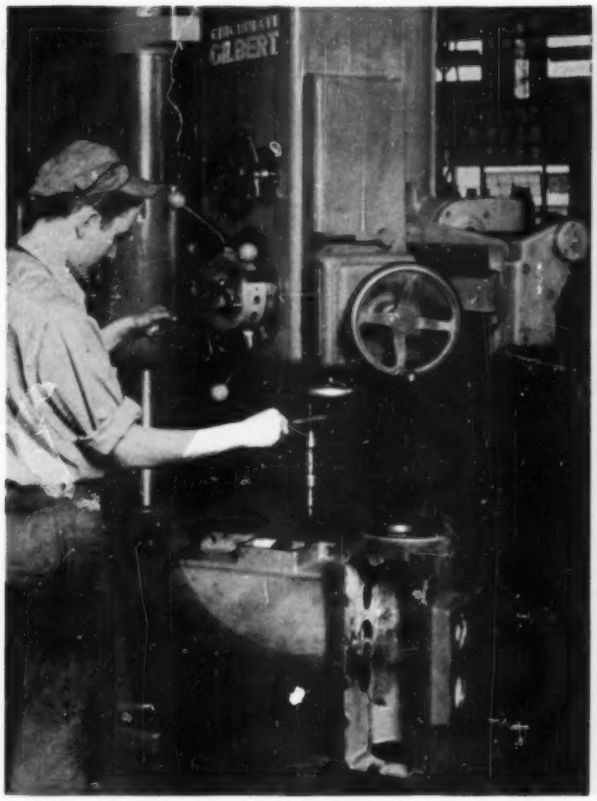

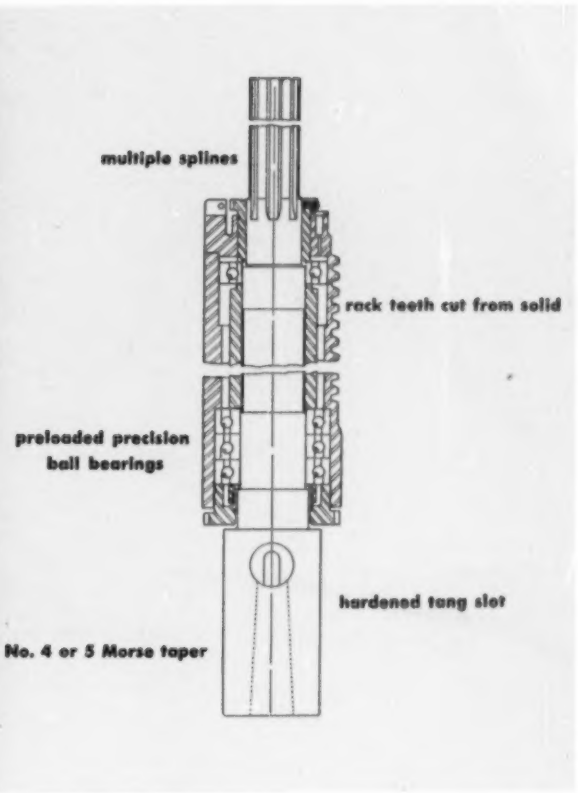

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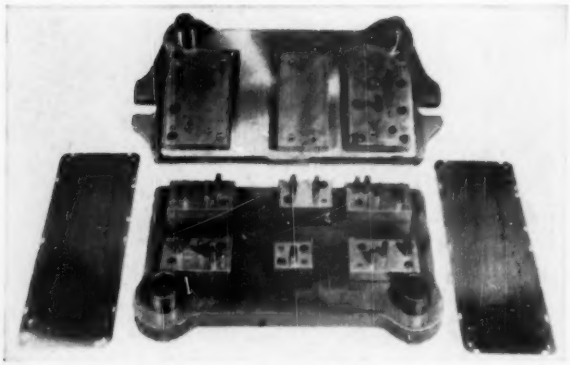
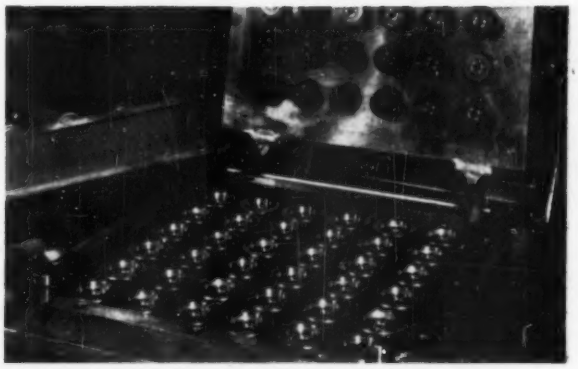
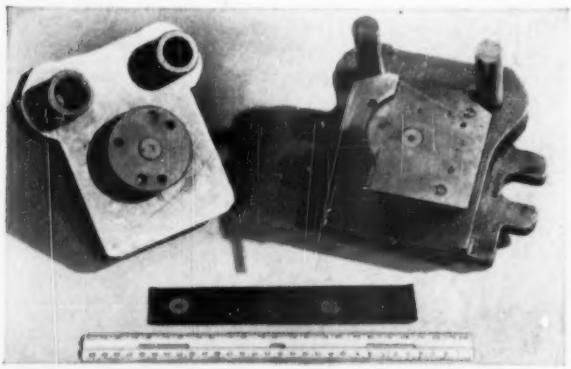
How free graphite in Graph-Mo® tool steel solved 4 big die problems



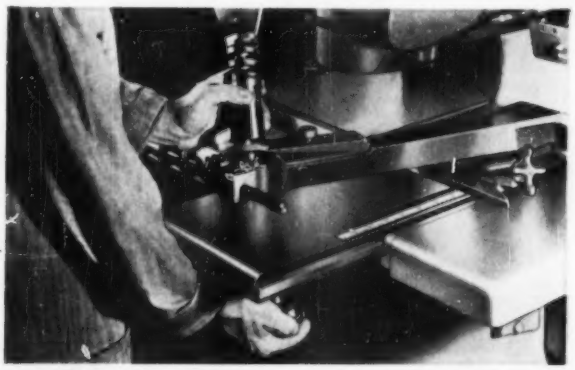
DIES USED BY PELTON & CRANE CO. became worn after a few hundred stampings. Holes in parts were ragged, punches chipped and cracked. After switching to Graph-Mo® tool steel for its dies, Pelton & Crane ran 12,000 stampings with no sign of wear. Free graphite and diamond-hard carbides in its structure give Graph-Mo minimum tendency to scuff or gall, unusual resistance to wear.



MOLDS USED BY PARKER APPLIANCE CO. lacked stability after hardening, were also hard to machine. Parker switched to Graph-Mo, reported, "Graph-Mo is ideal because it is free machining, dimensionally stable after hardening". Graph-Mo tool steel machines 30% easier.



GEAR DIES USED BY RELIABLE TOOL & DIE CO. threw burrs. Gear teeth spalled, dies chipped, didn't last long. Then Reliable switched to Graph-Mo tool steel for its dies. Result: dies now produce up to 80,000 without a burr. Free graphite gives Graph-Mo minimum tendency to scuff, seize or gall.



AFTER TESTING SEVERAL oil hardening tool steels for punches and dies, Wales-Strippit Corp. selected Graph-Mo. They report, "Graph-Mo provides long life with minimum galling, exceptional wear resistance." For information on Graph-Mo and three other Timken® graphitic tool steels, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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